

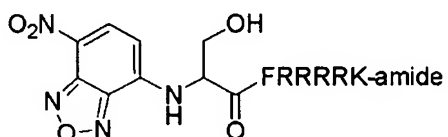
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Amendments to the Claims:

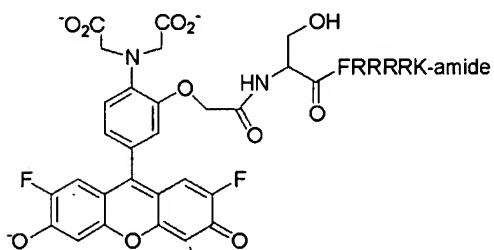
Please cancel Claim 95 without prejudice or disclaimer, amend Claims 49, 56, 79-80, 83, 88, 90, 92-93, 96-97 and 122, and add new Claims 149-150 as set forth below.

1-48. (Canceled)

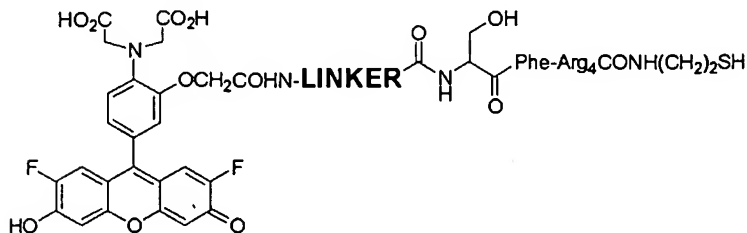
49. (Currently amended) A substrate for a protein kinase, wherein the substrate is selected from the group consisting of:



(SEQ ID NO:3),



(SEQ ID NO:3), and

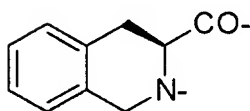
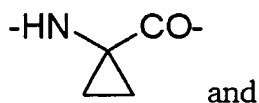


;

wherein F is phenylalanine, K is lysine, and R is arginine; and wherein the LINKER

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is selected from the group consisting of N-methyl glycine, L-proline, D-proline,



50-55. (Canceled)

56. (Currently amended) A substrate for a protein kinase, wherein the substrate comprises:

a peptide substrate for the protein kinase, wherein the peptide comprises a serine, a threonine, or a tyrosine on a terminal end of the peptide;

at least one fluorophore, wherein a fluorophore is attached to the serine, the threonine, or the tyrosine on the terminal end of the peptide;

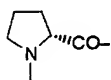
wherein the fluorophore is attached directly to the peptide or the a fluorophore is attached to the peptide by a linker selected from the group consisting of

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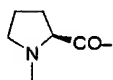
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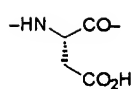
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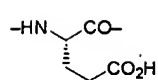
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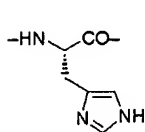
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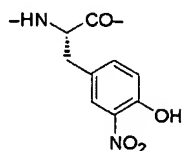
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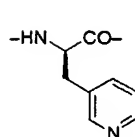
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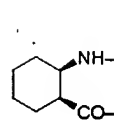
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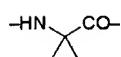
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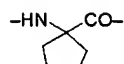
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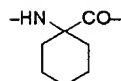
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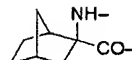
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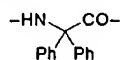
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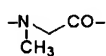
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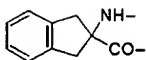
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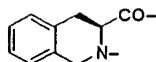
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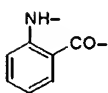
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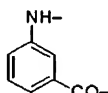
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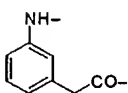
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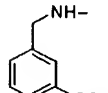
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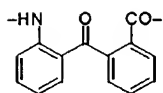
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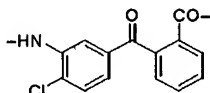
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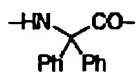


v

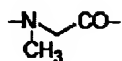
no linker

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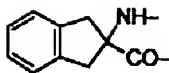
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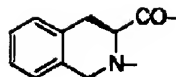
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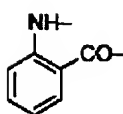
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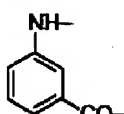
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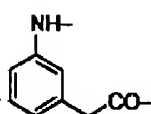
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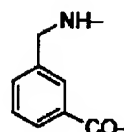
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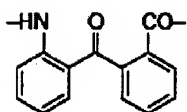
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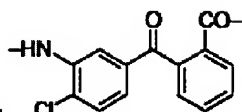


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and



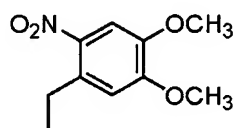
v

_____ ; and
 wherein

- (i) the substrate is specific for a protein kinase subtype,
- (ii) the fluorophore is attached to the C-terminal end of the peptide,
- (iii) a fluorophore is attached to each terminal end of the peptide,
- (iv) a first fluorophore is attached to a terminal end of the peptide and a second fluorophore, with photophysical properties distinct from the first fluorophore, is attached to any nonterminal site on the peptide,
- (v) the fluorophore is a 7-nitrobenz-2-oxa-1,3-diazole derivative,
- ~~(vi) the fluorophore is attached to the peptide by a linker selected from the group consisting of a carboxamide linker, an aminobenzoic acid linker, a sulfonamide linker, a urea linker, a thiourea linker, an ester linker, a thioester linker, an alkylamine linker, an arylamine linker, an ether linker, and a thioether linker, and/or~~

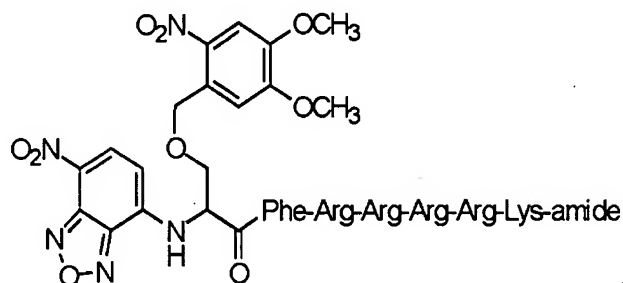
(vi)~~(vii)~~ the substrate further comprises a carbohydrate, a lipid or a nucleic acid.

57. (Previously presented) The substrate of claim 148, wherein the photolabile side chain comprises the structure



58. (Original) The substrate of claim 56, wherein the substrate comprises a serine with a photolabile side chain that blocks phosphoryl transfer.

59. (Previously presented) The substrate of claim 56, wherein the substrate has the structure



60. (Previously presented) The substrate of claim 148, wherein after removal of the photolabile side chain, phosphorylation by a protein kinase of the terminal serine, the terminal threonine, or the terminal tyrosine to which the fluorophore is attached produces at least a 20% change in fluorescence intensity.

61. (Previously presented) The substrate of claim 148, wherein after removal of the photolabile side chain, phosphorylation by a protein kinase of the terminal serine, the terminal threonine, or the terminal tyrosine to which the fluorophore is attached produces at least a 20% increase in fluorescence intensity.

62. (Previously presented) The substrate of claim 148, wherein after removal of the photolabile side chain, phosphorylation by a protein kinase of the terminal serine, the terminal threonine, or the terminal tyrosine to which the fluorophore is attached produces at least a 20% decrease in fluorescence intensity.

63. (Previously presented) The substrate of claim 60, wherein phosphorylation of the substrate by the protein kinase produces at least a 70% change in fluorescence intensity.

64. (Original) The substrate of claim 63, wherein phosphorylation of the substrate by the protein kinase produces at least a 100% change in fluorescence intensity.

65. (Original) The substrate of claim 64, wherein phosphorylation of the substrate by the protein kinase produces at least a 150% change in fluorescence intensity.

66. (Original) The substrate of claim 65, wherein phosphorylation of the substrate by the protein kinase produces at least a 250% change in fluorescence intensity.

67. (Previously presented) The substrate of claim 56, wherein the substrate is specific for a protein kinase subtype.

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68. (Original) The substrate of claim 67, wherein the substrate is specific for protein kinase C.

69. (Original) The substrate of claim 68, wherein the substrate is specific for isoforms α , β , and γ of protein kinase C.

70. (Withdrawn) The substrate of claim 67, wherein the substrate is specific for protein kinase A, protein kinase B, protein kinase D, protein kinase G, Ca^{2+} /calmodulin-dependent protein kinase, mitogen-activated protein kinase, protein kinase mos, protein kinase raf, protein tyrosine kinase, tyrosine kinase abl, tyrosine kinase src, tyrosine kinase yes, tyrosine kinase fps, tyrosine kinase met, cyclin-dependent protein kinase, or cdc2 kinase.

71. (Previously presented) The substrate of claim 56, wherein the substrate further comprises a carbohydrate, a lipid or a nucleic acid.

72. (Canceled)

73. (Previously presented) The substrate of claim 56, wherein the fluorophore is attached to the C-terminal end of the peptide.

74. (Previously presented) The substrate of claim 56, wherein the fluorophore is attached to the N-terminal end of the peptide.

75. (Previously presented) The substrate of claim 56, wherein a fluorophore is attached to each terminal end of the peptide.

76. (Original) The substrate of claim 75, wherein fluorophores with distinct photophysical properties are attached to different terminal ends of the peptide.

77. (Previously presented) The substrate of claim 56, wherein a first fluorophore is attached to a terminal end of the peptide and a second fluorophore, with photophysical properties distinct from the first fluorophore, is attached to any nonterminal site on the peptide.

78. (Previously presented) The substrate of claim 56, wherein the fluorophore is a 7-nitrobenz-2-oxa-1,3-diazole derivative.

79. (Withdrawn and Currently amended) The substrate of claim 56, wherein the fluorophore comprises is a fluorescein group derivative.

80. (Withdrawn and Currently amended) The substrate of claim 56, wherein the fluorophore comprises ~~is selected from the group consisting of~~ a dansyl group derivative, an acridine group derivative, an Alexa Fluor group derivative, a BODIPY group derivative, an Oregon Green group derivative, a Rhodamine Green group derivative, a Rhodamine Red-X group derivative, a Texas Red group derivative, a Cascade Blue group derivative, a Cascade Yellow group derivative, a Marina Blue group derivative, a Pacific Blue group derivative, an AMCA-X group derivative, or and a coumarin group derivative.

81. (Canceled)

82. (Withdrawn) The substrate of claim 56, wherein the fluorophore is attached to

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the peptide by a metal chelating linker.

83. (Currently amended) ~~The substrate of claim 56,~~

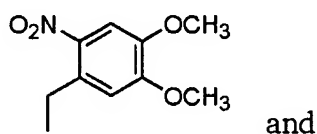
A substrate for a protein kinase, wherein the substrate comprises:

a peptide comprising a serine, a threonine, or a tyrosine on a terminal end of the peptide;

at least one fluorophore, wherein a fluorophore is attached to the serine, the threonine, or the tyrosine on the terminal end of the peptide; and

a photolabile side chain attached to the serine, the threonine, or the tyrosine on the terminal end of the peptide, wherein the photolabile side chain blocks transfer of a phosphoryl group from adenosine triphosphate to a hydroxyl moiety of the serine, the threonine, or the tyrosine so that the substrate cannot be phosphorylated by a protein kinase until the photolabile side chain is removed from the substrate, and

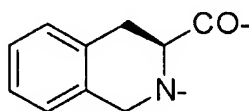
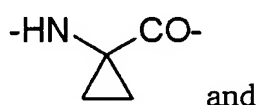
wherein the the photolabile side chain comprises the structure



wherein the fluorophore is attached to the peptide by a linker selected from the group consisting of a carboxamide linker, an aminobenzoic acid linker, a sulfonamide linker, a urea linker, a thiourea linker, an ester linker, a thioester linker, an alkylamine linker, an arylamine linker, an ether linker, and a thioether linker.

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84. (Withdrawn) The substrate of claim 56, wherein the fluorophore is attached to the peptide by a linker selected from the group consisting of N-methyl glycine, L-proline, D-proline,



85. (Canceled)

86. (Previously presented) A composition comprising the substrate of claim 56, and a carrier.

87. (Original) The composition of claim 86, wherein the composition is a pharmaceutical composition and the carrier is a pharmaceutically acceptable carrier.

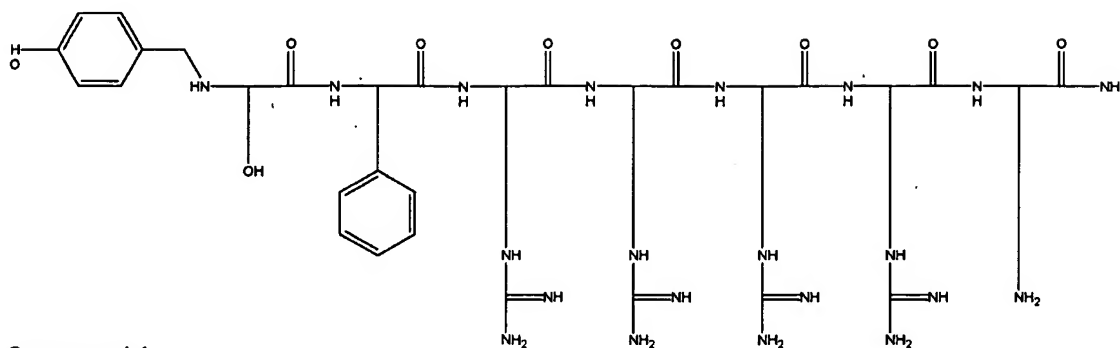
88. (Currently amended) A chemical compound selected from the group of compounds consisting of:

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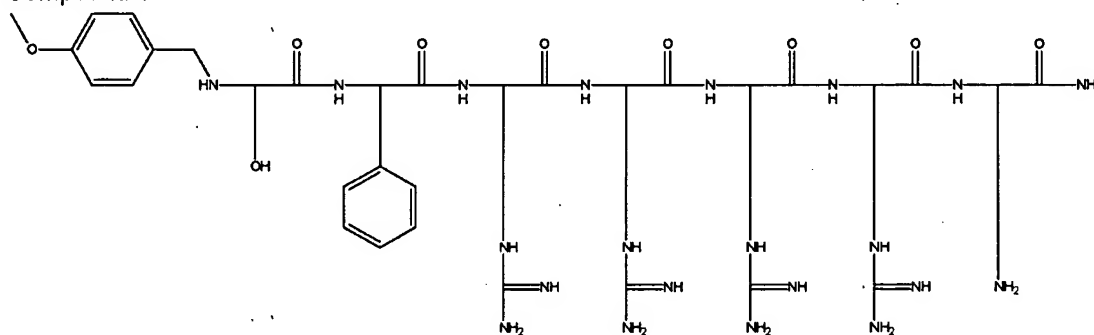
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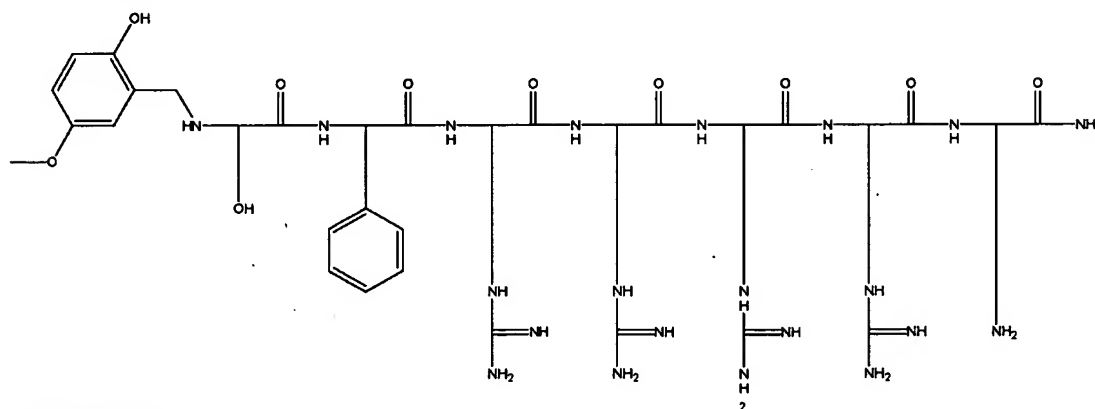
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Compound 1



Compound 2



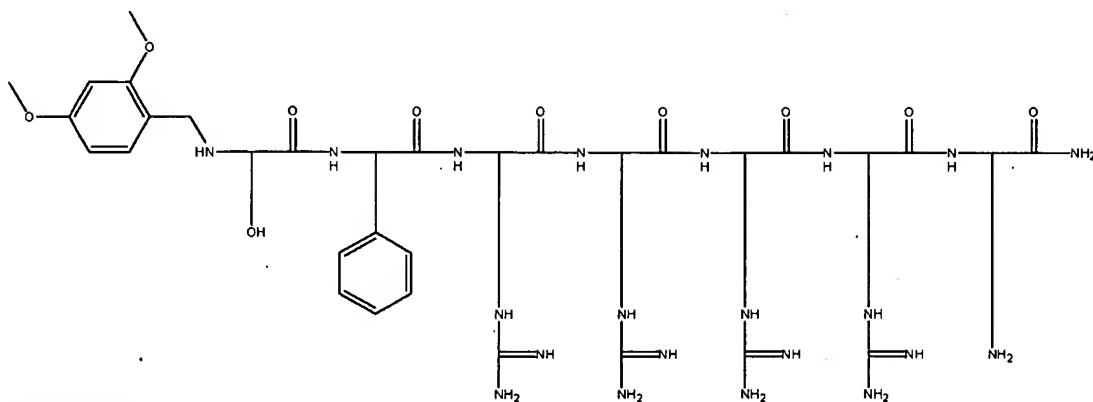
Compound 3

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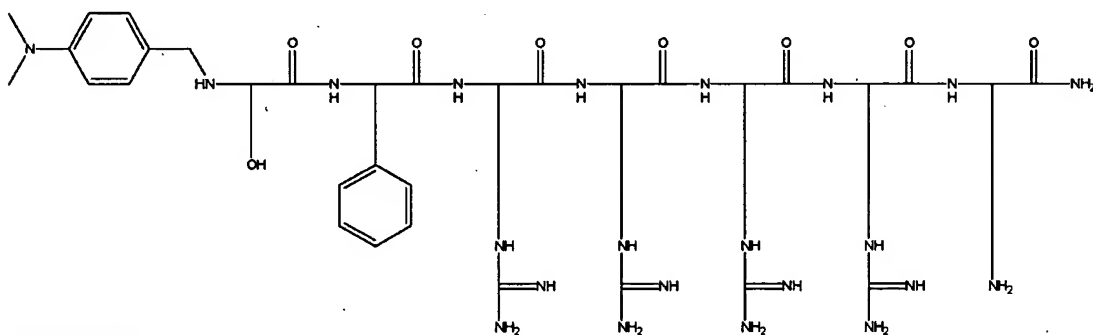
Serial No.: 10/755,086

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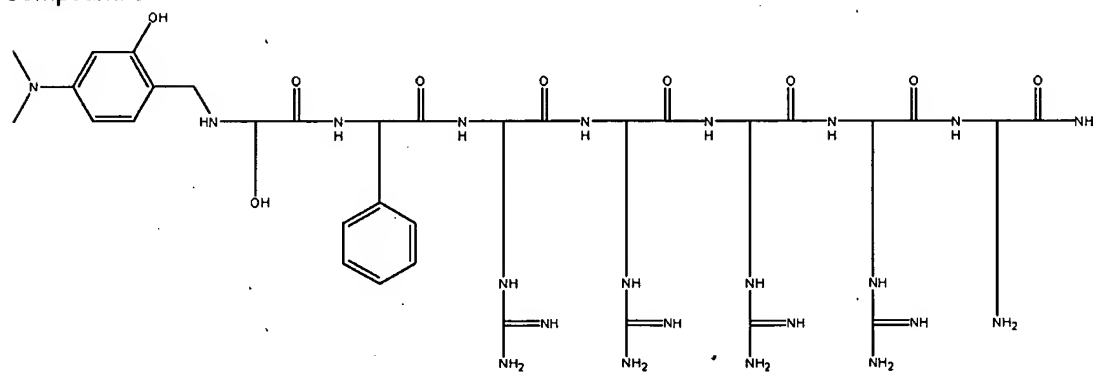
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Compound 4



Compound 5



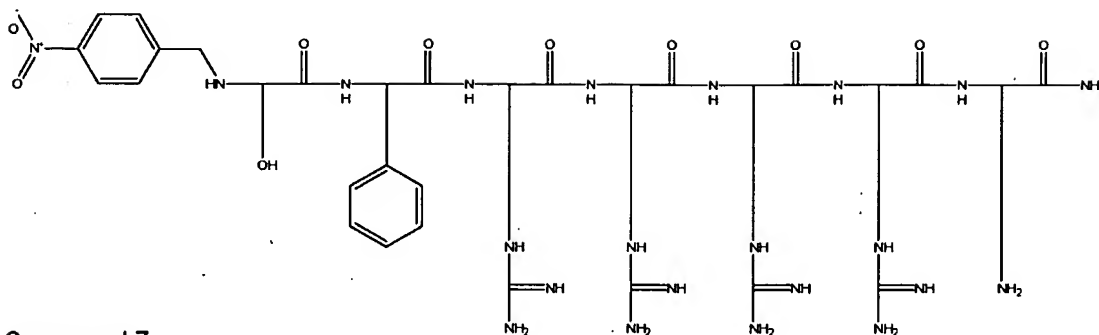
Compound 6

Applicant: David S. Lawrence

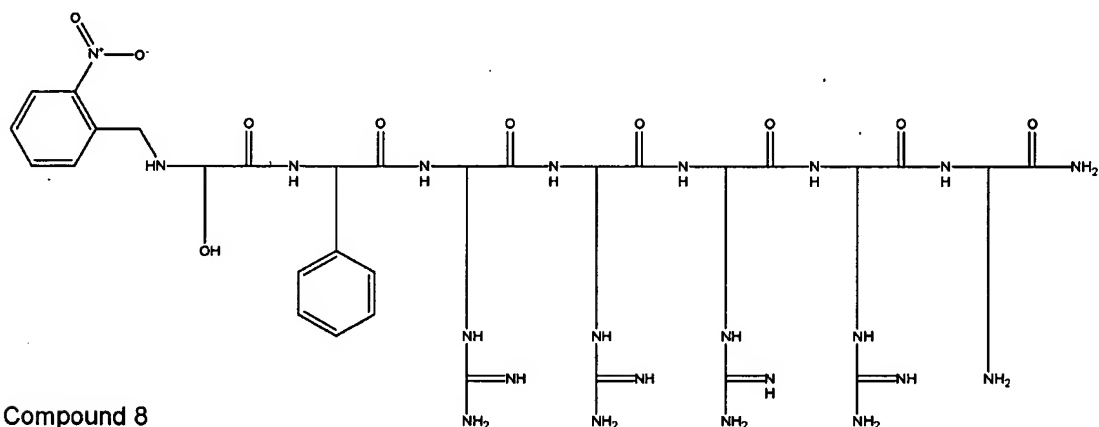
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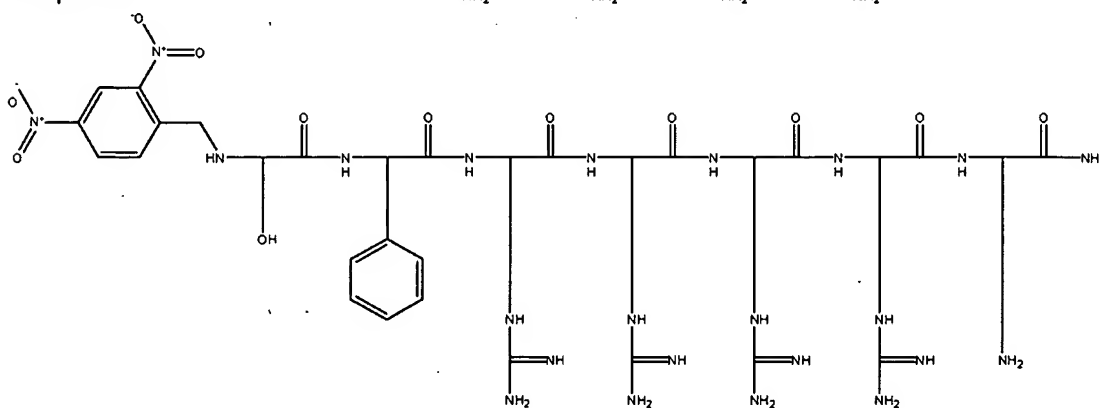
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Compound 7



Compound 8



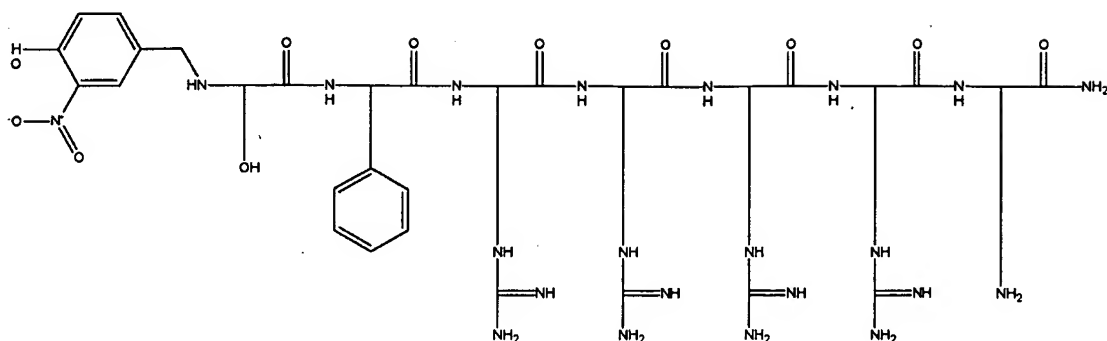
Compound 9

Applicant: David S. Lawrence

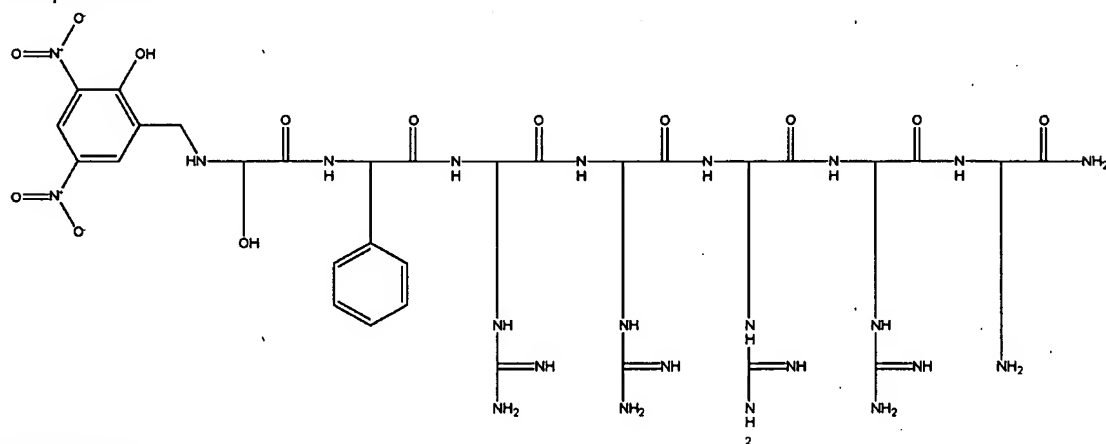
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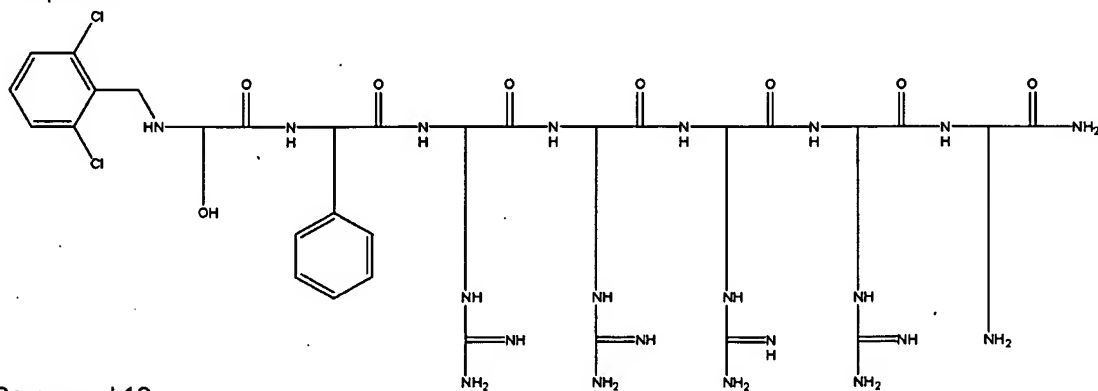
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Compound 10



Compound 11



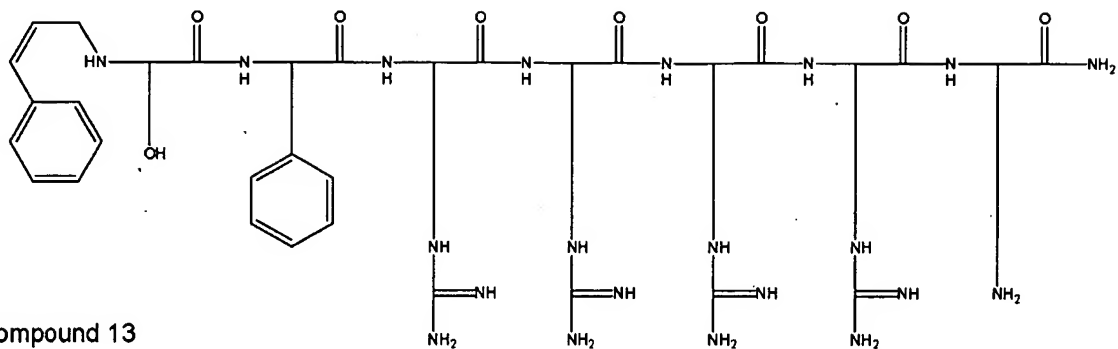
Compound 12

Applicant: David S. Lawrence

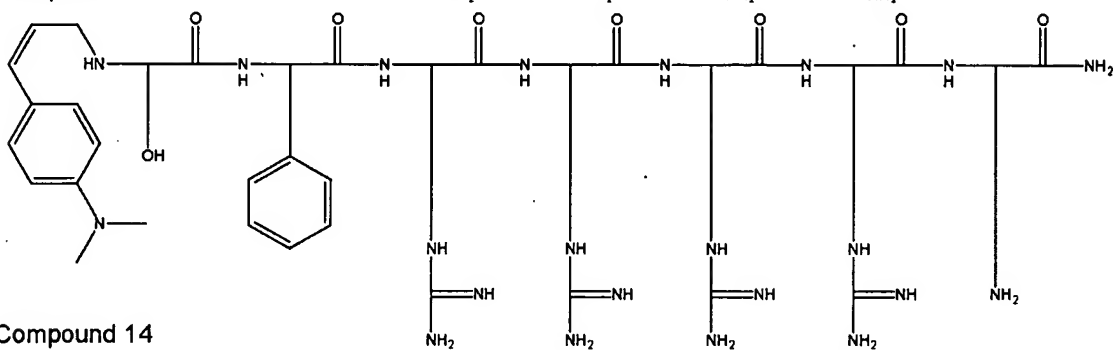
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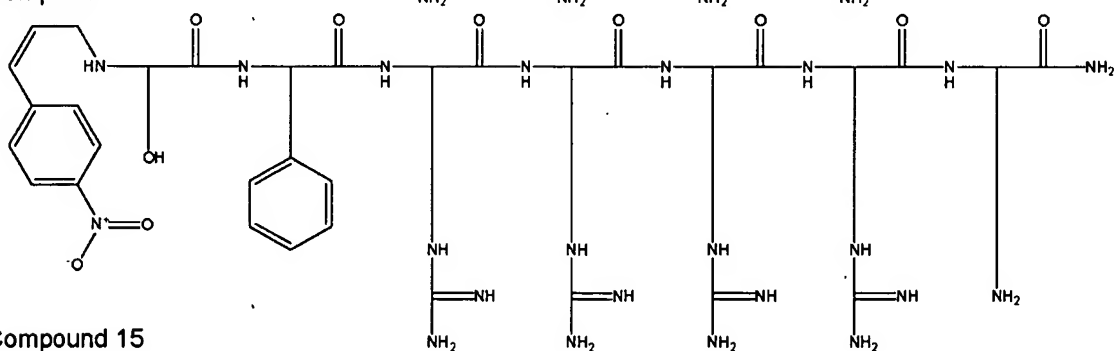
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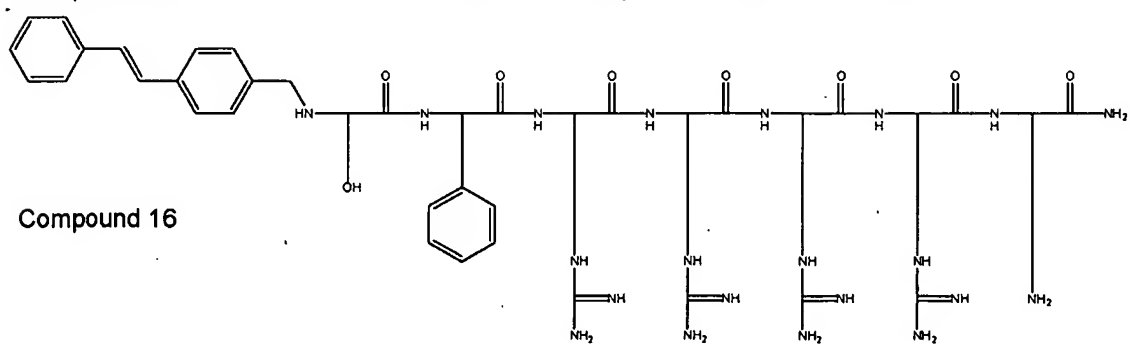
Compound 13



Compound 14



Compound 15



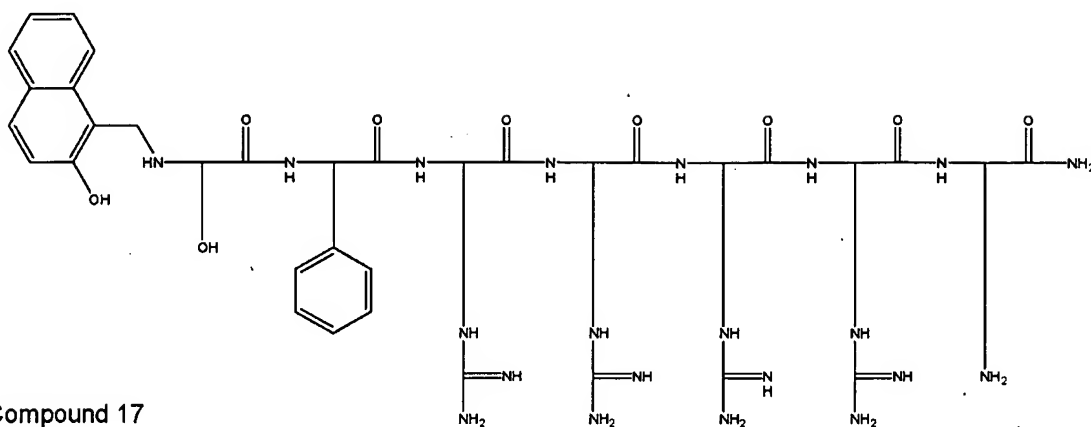
Compound 16

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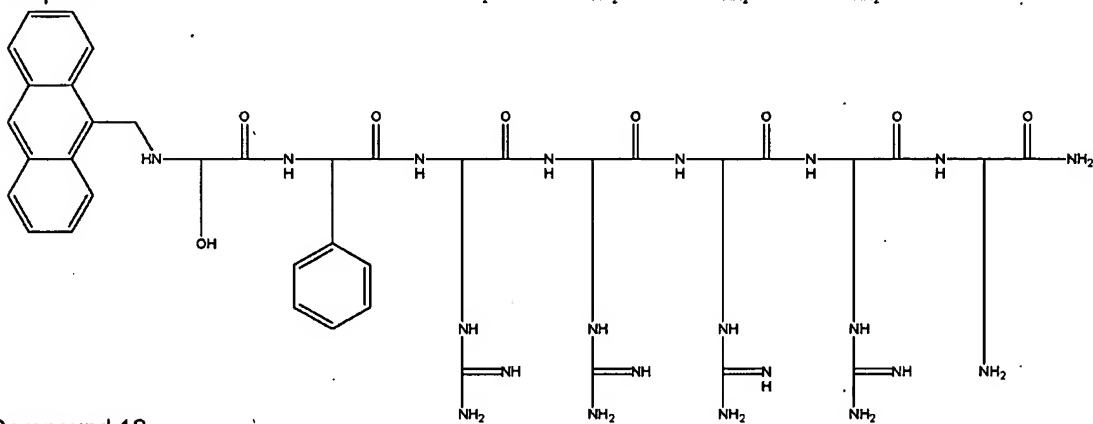
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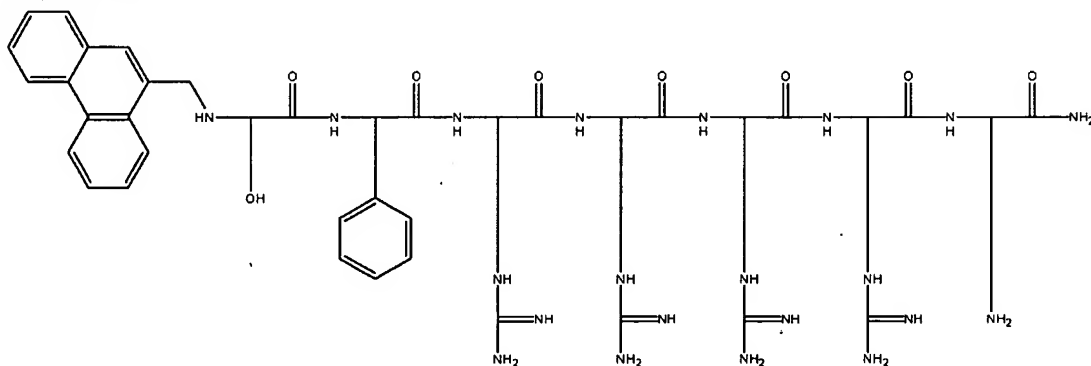
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Compound 17



Compound 18



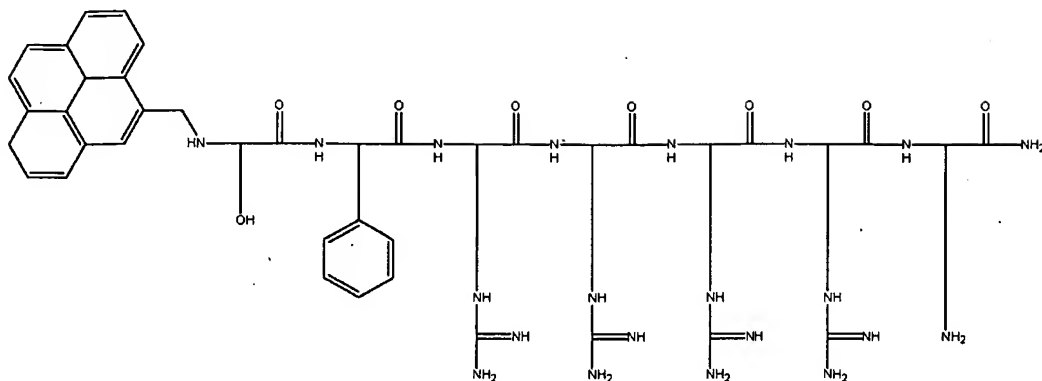
Compound 19

Applicant: David S. Lawrence

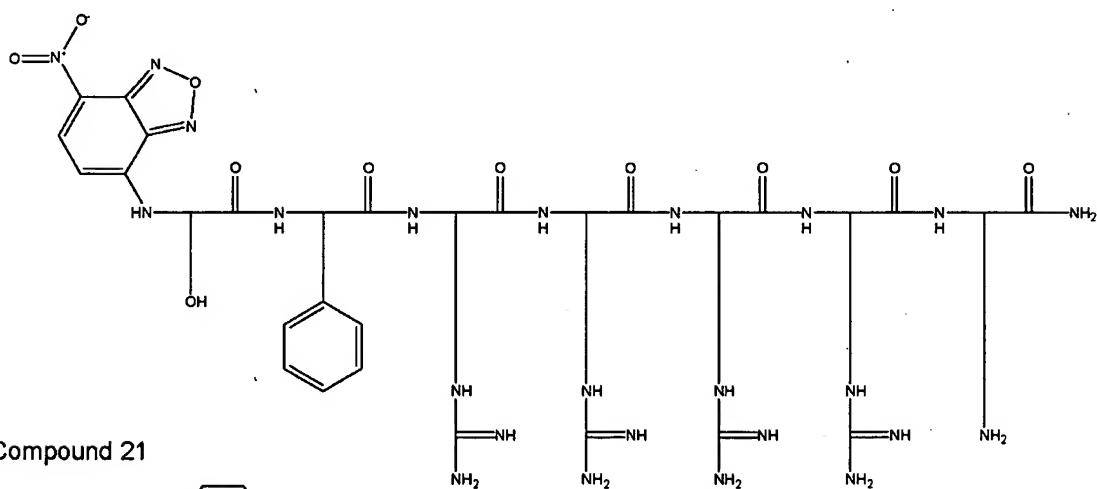
Serial No.: 10/755,086

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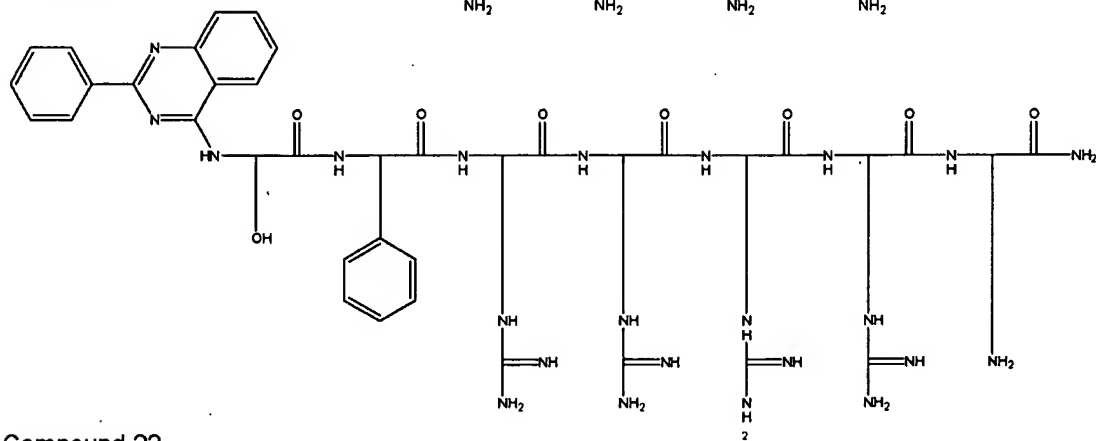
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Compound 20



Compound 21



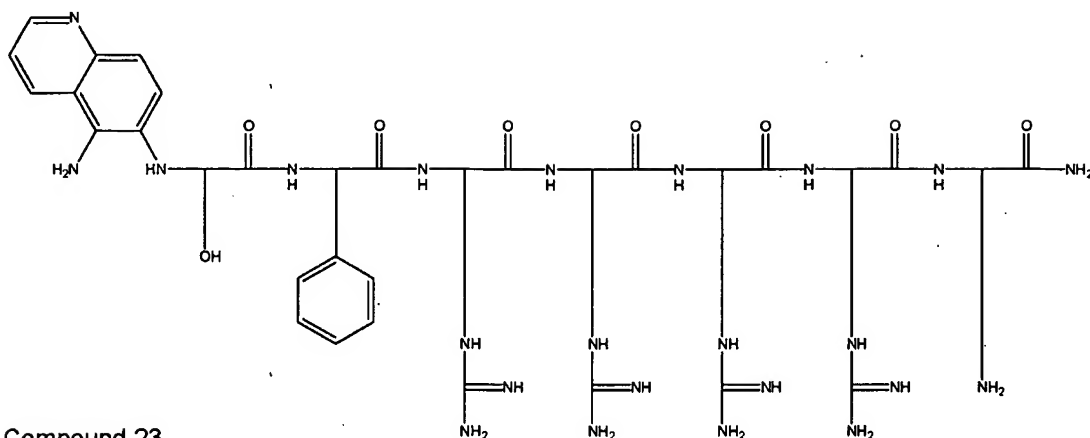
Compound 22

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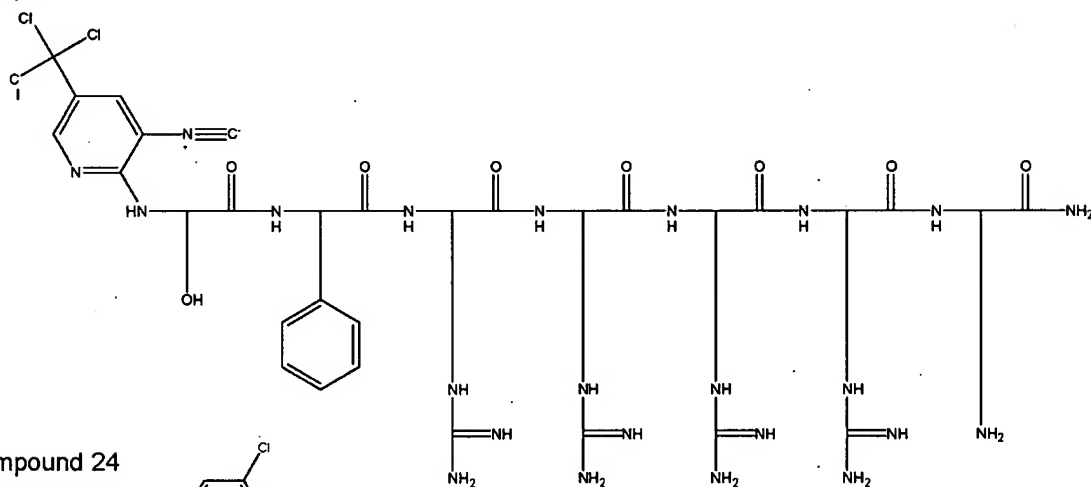
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Filed: January 9, 2004

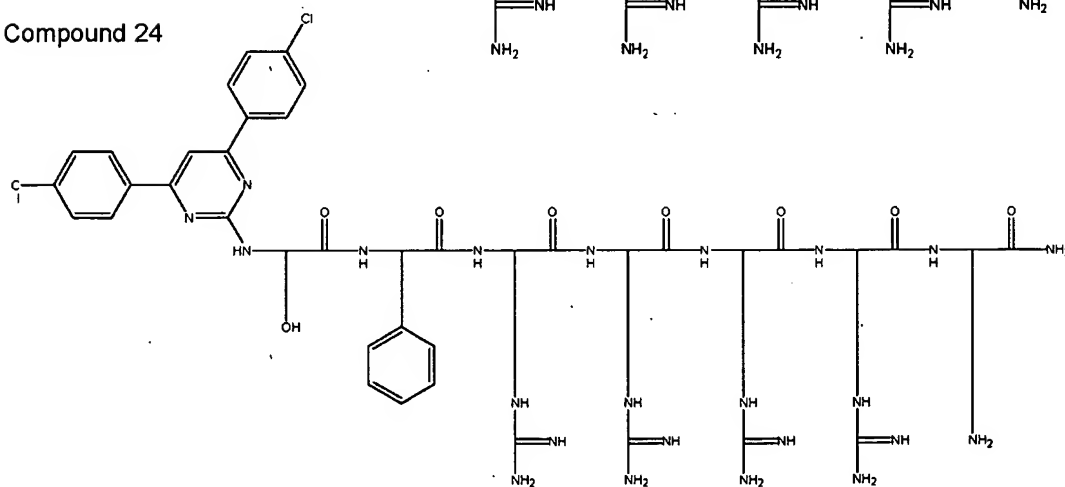
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Compound 23



Compound 24



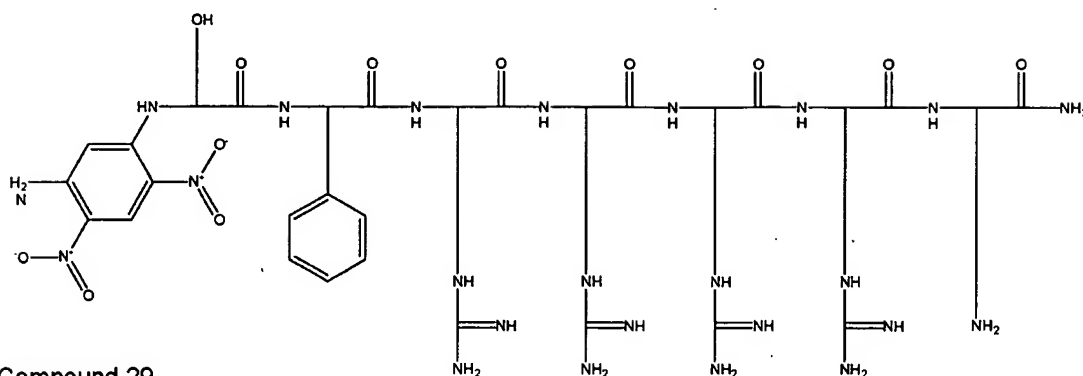
Compound 25

Applicant: David S. Lawrence

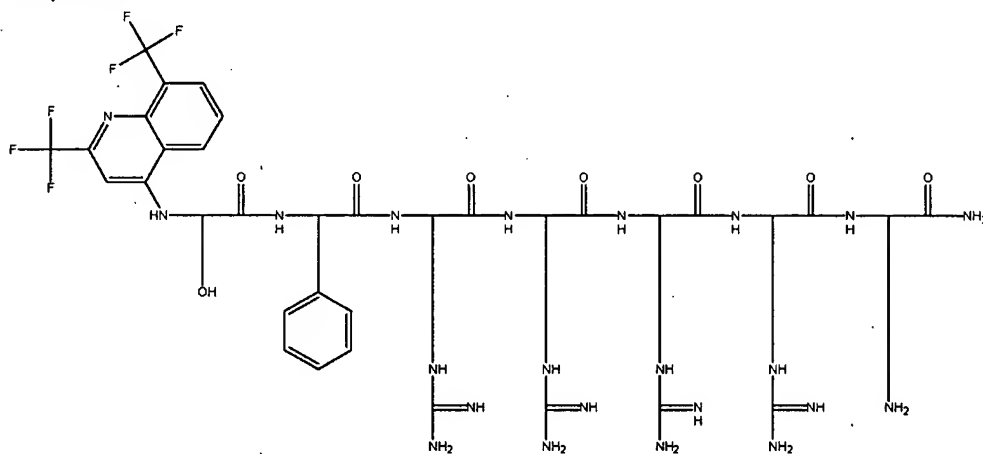
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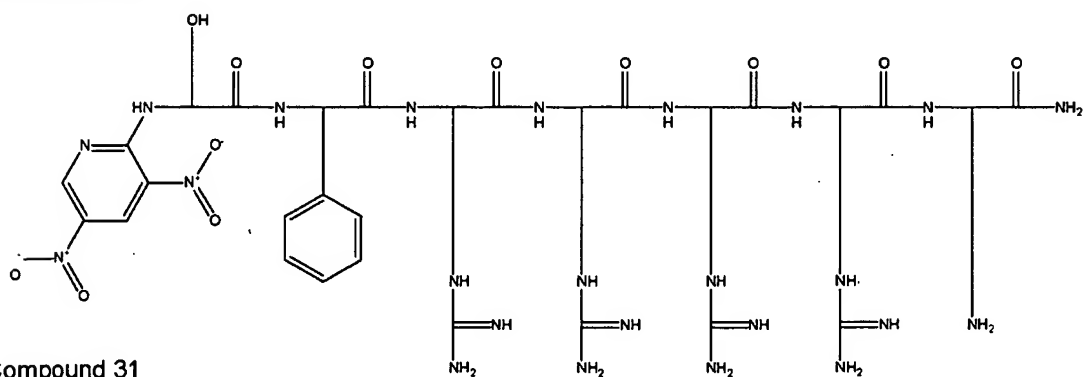
page 22 of 193



Compound 29



Compound 30



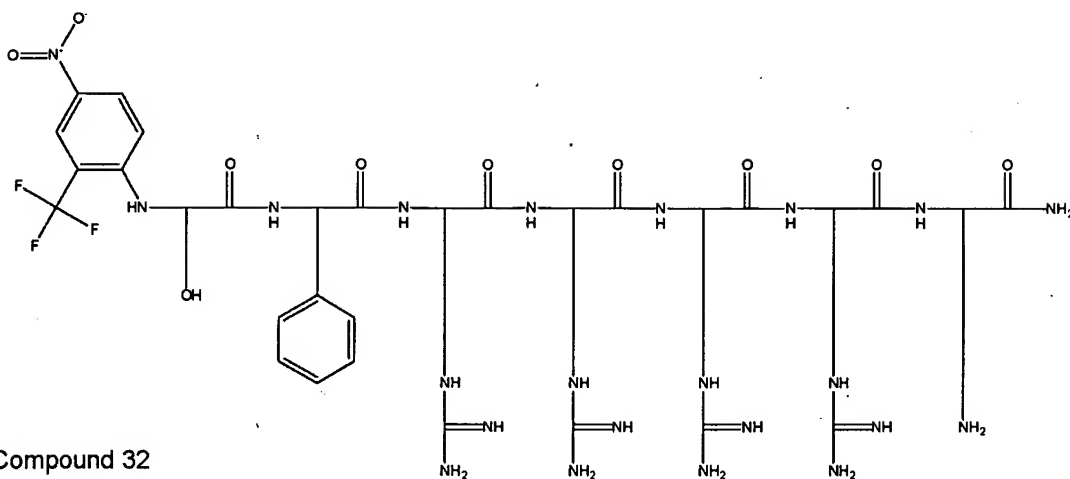
Compound 31

Applicant: David S. Lawrence

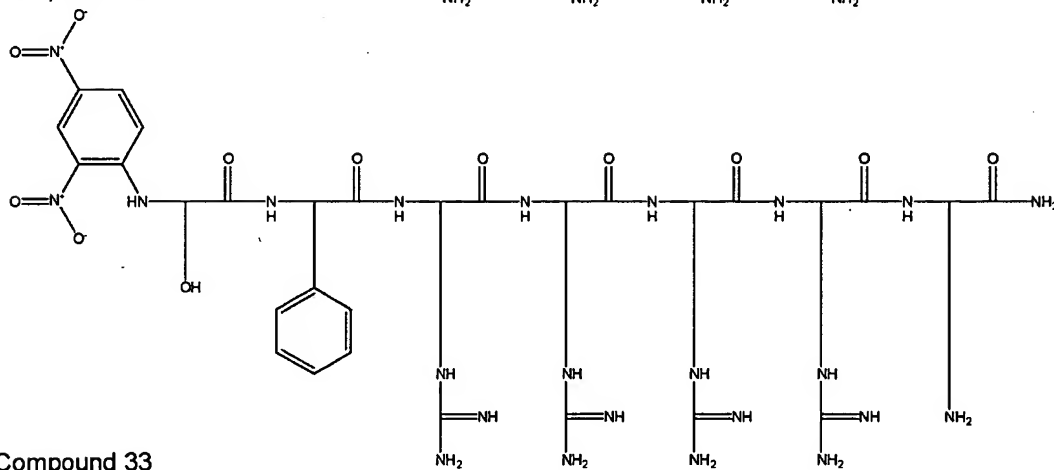
Serial No.: 10/755,086

Filed: January 9, 2004

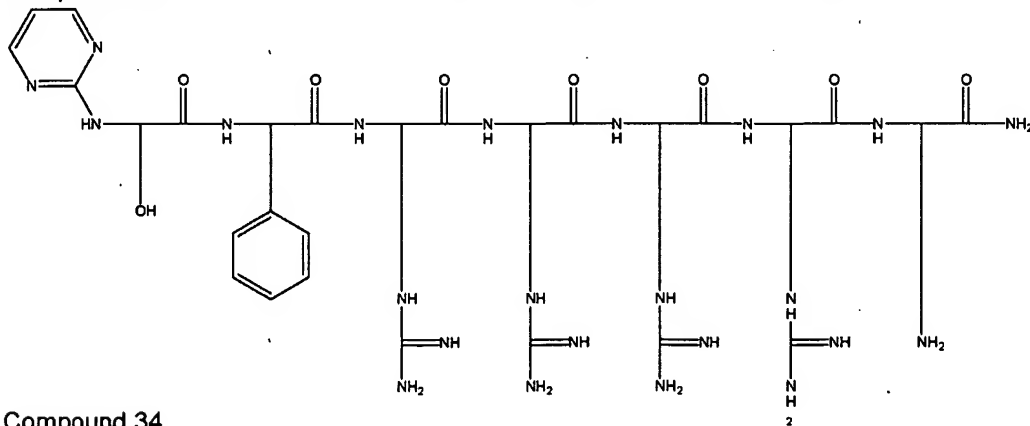
page 23 of 193



Compound 32

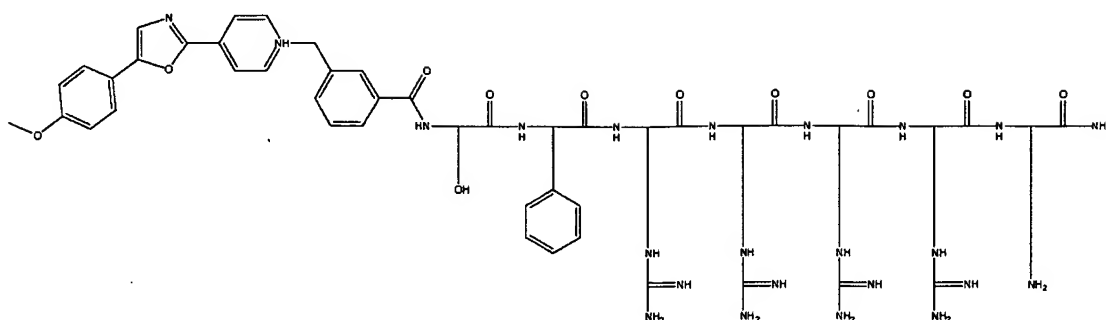


Compound 33

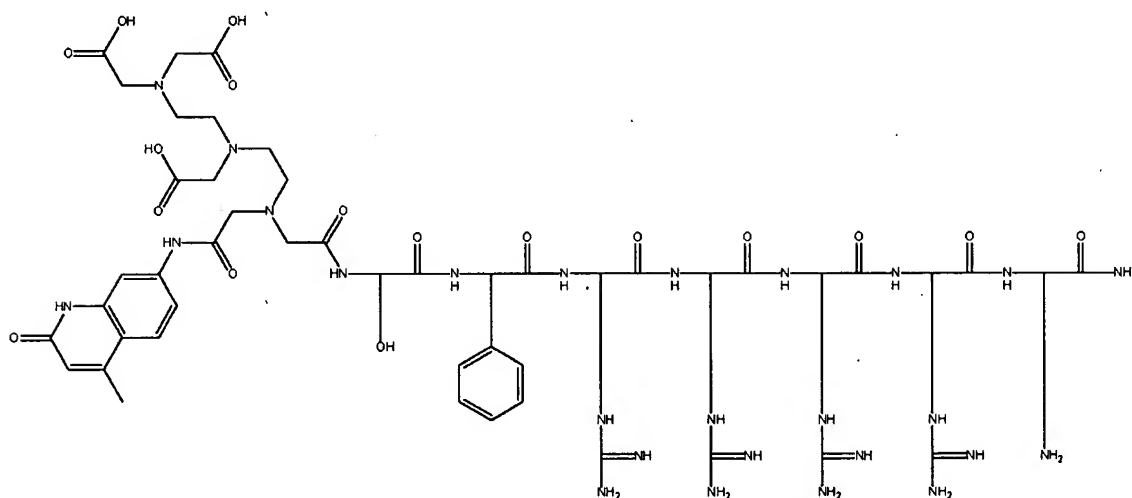


Compound 34

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Compound 35



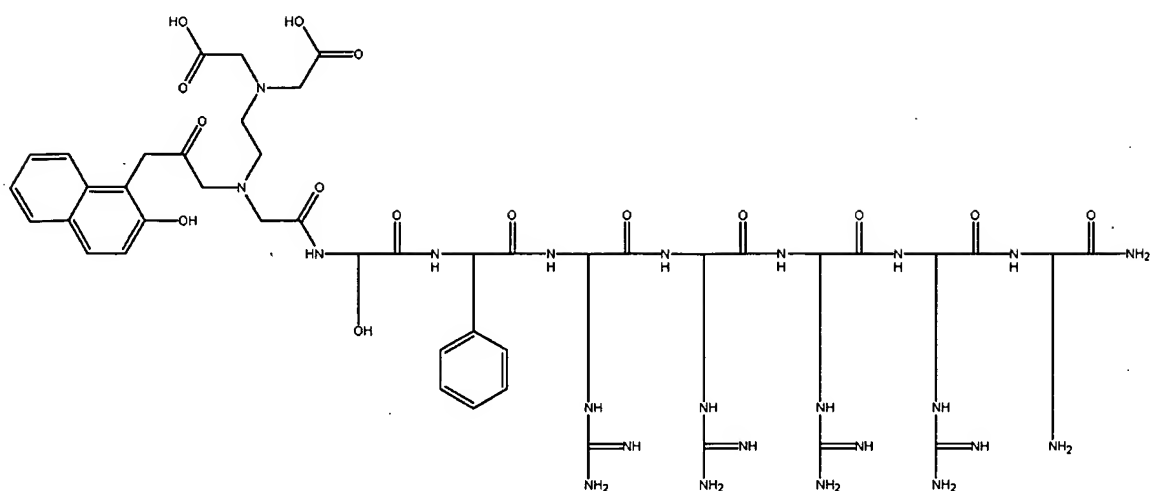
Compound 36

Applicant: David S. Lawrence

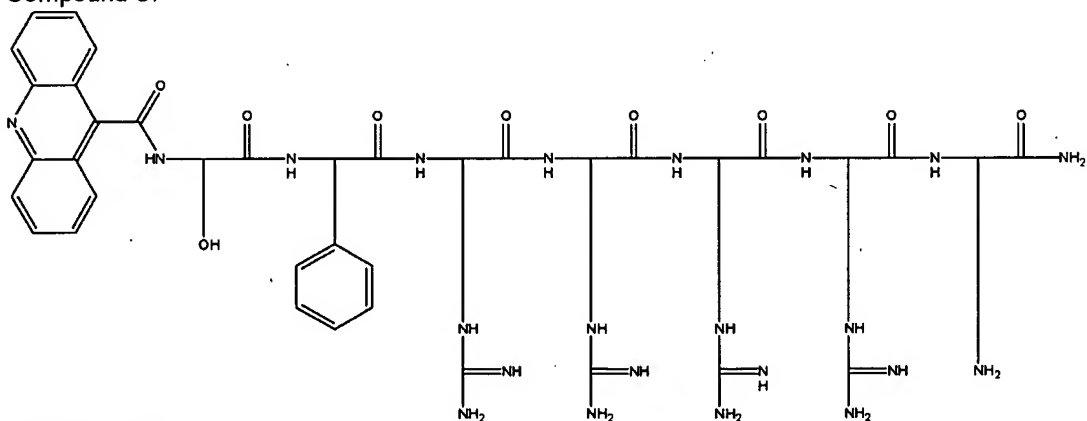
Serial No.: 10/755,086

Filed: January 9, 2004

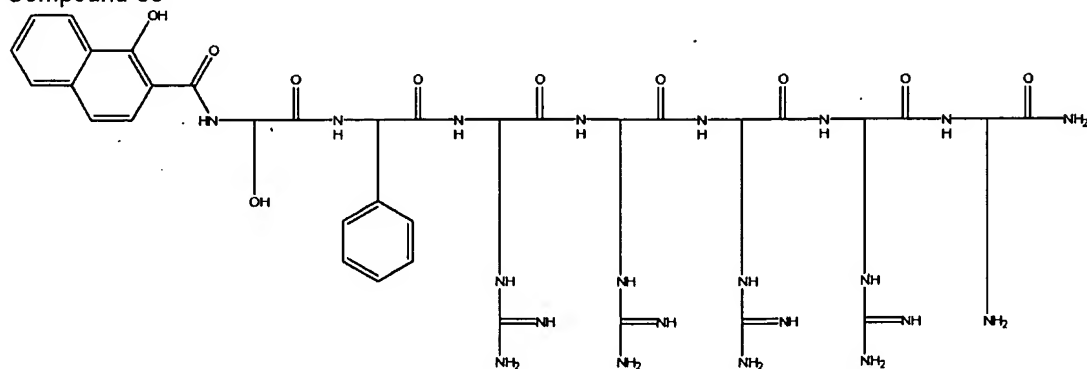
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Compound 37



Compound 38



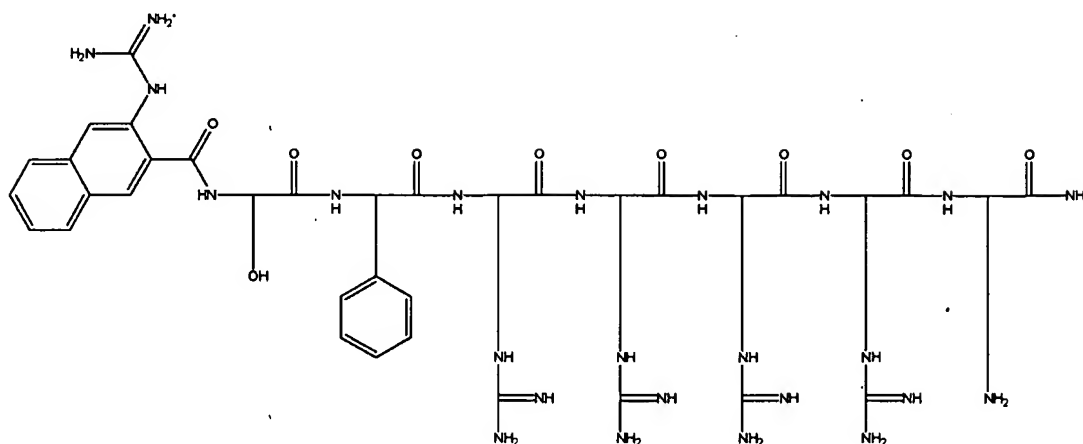
Compound 39

Applicant: David S. Lawrence

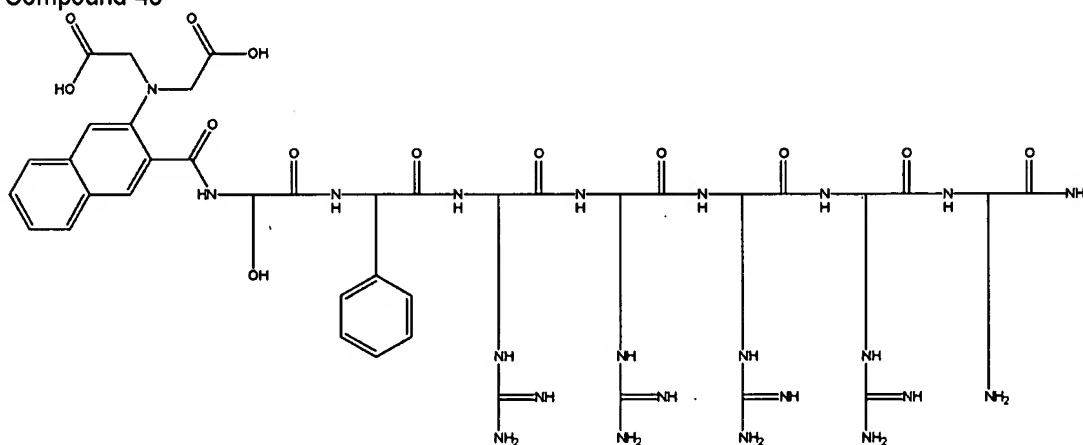
Serial No.: 10/755,086

Filed: January 9, 2004

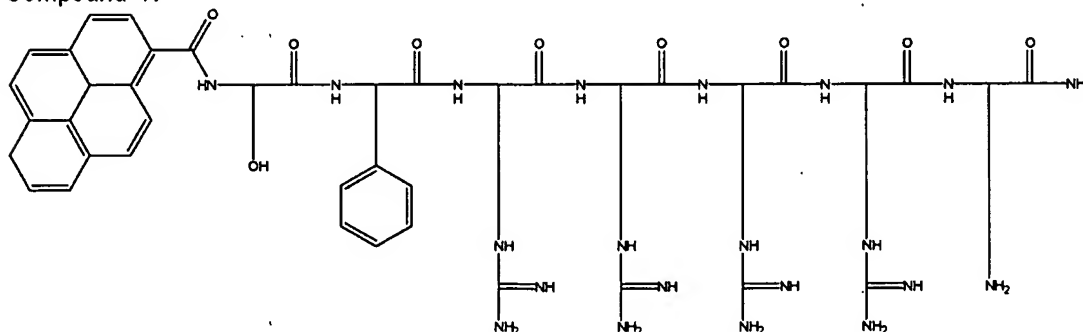
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Compound 40

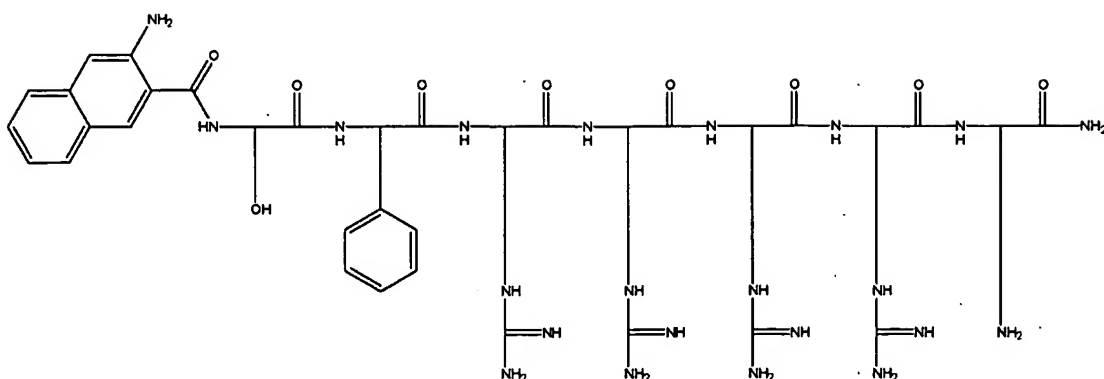


Compound 41

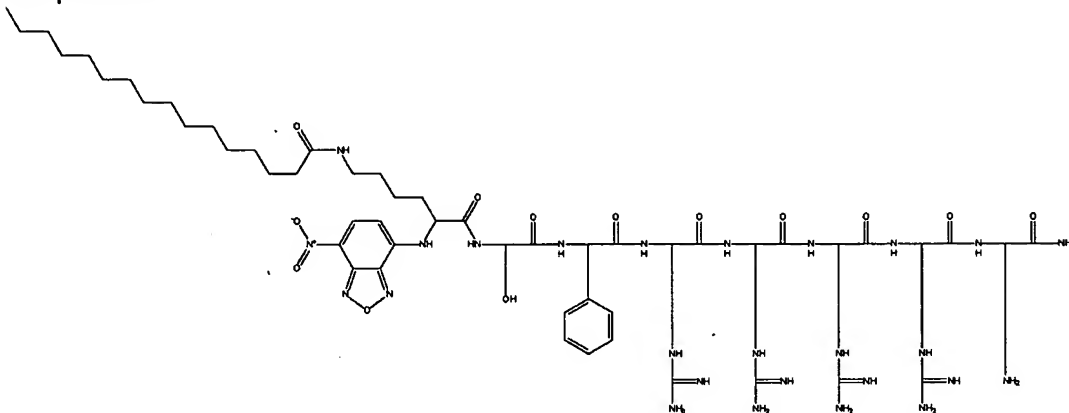


Compound 42

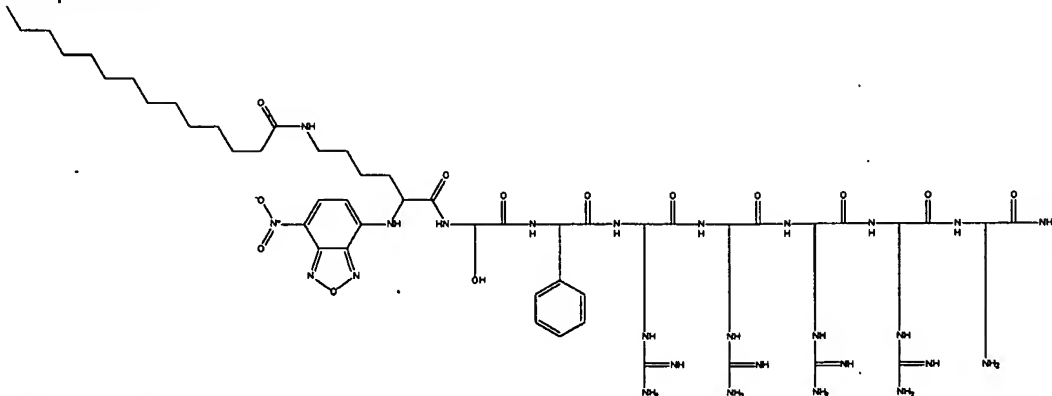
Applicant: David S. Lawrence
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Compound 43

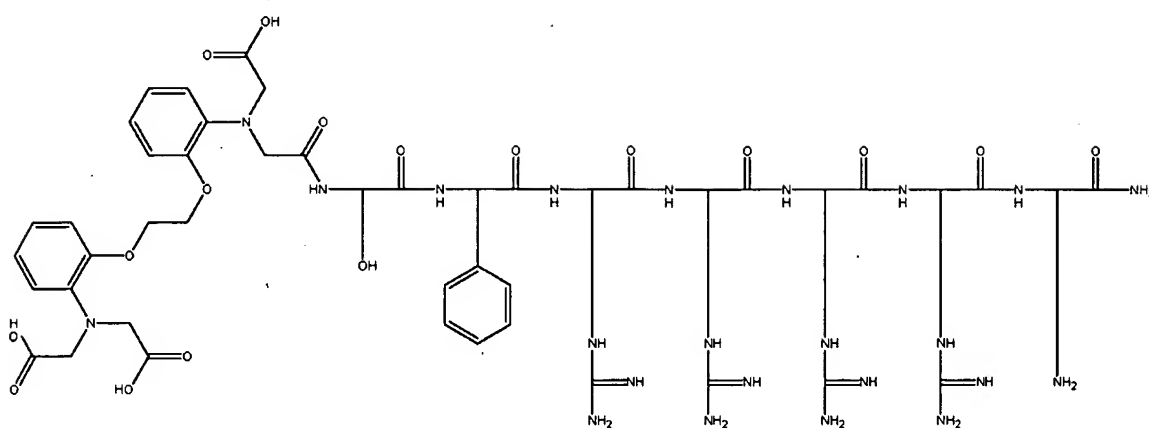


Compound 44



Compound 45

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Compound 1

Chemical structure of Compound 1: A quinoline-2-carboxamide derivative. The quinoline ring is attached to a carbonyl group, which is linked to an NH group. This NH is part of a peptide backbone. The backbone consists of a series of amide bonds. The side chains are: a hydroxyl group (OH), a phenyl ring, and four hydrazide groups (NH-C(=O)-NH₂).

Nc1ccc(cc1)C(=O)N[C@@H](Cc2ccccc2)C(=O)N[C@@H](CO)C(=O)N[C@@H](NC(=O)c3nc4cccc5ccccc4n3)C(=O)N[C@@H](NC(=O)N)C(=O)N[C@@H](NC(=O)N)C(=O)N[C@@H](NC(=O)N)C(=O)N[C@@H](NC(=O)N)C(=O)N

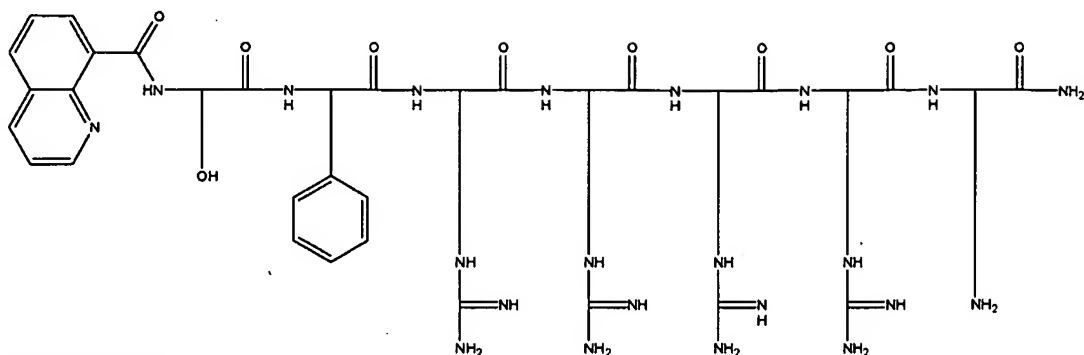
428233.1

Applicant: David S. Lawrence

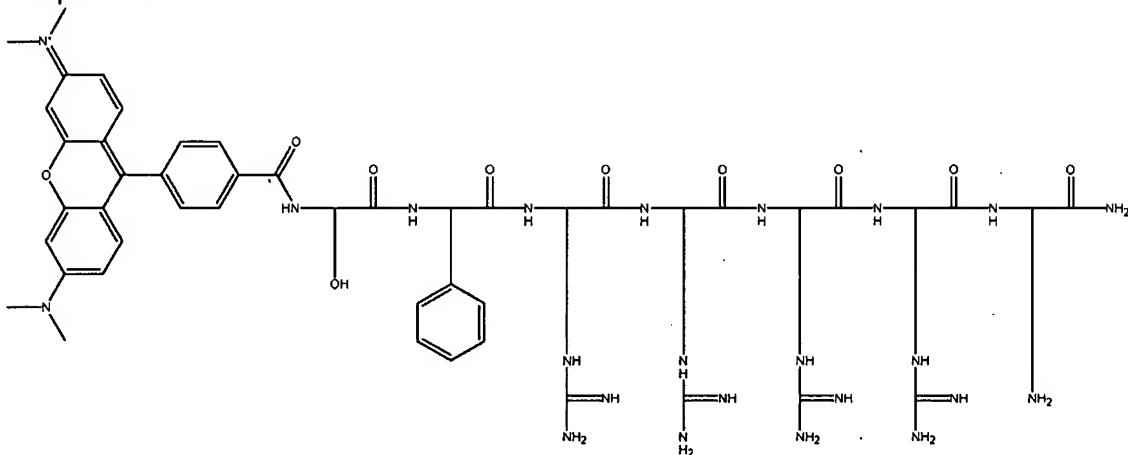
Serial No.: 10/755,086

Filed: January 9, 2004

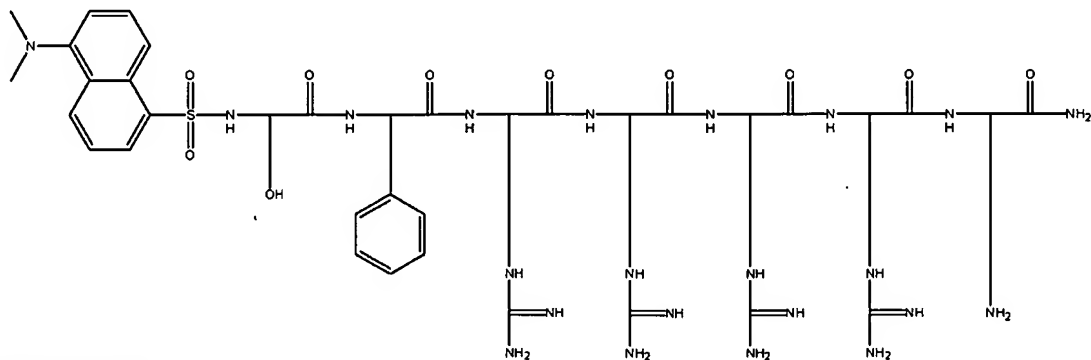
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Compound 49



Compound 50



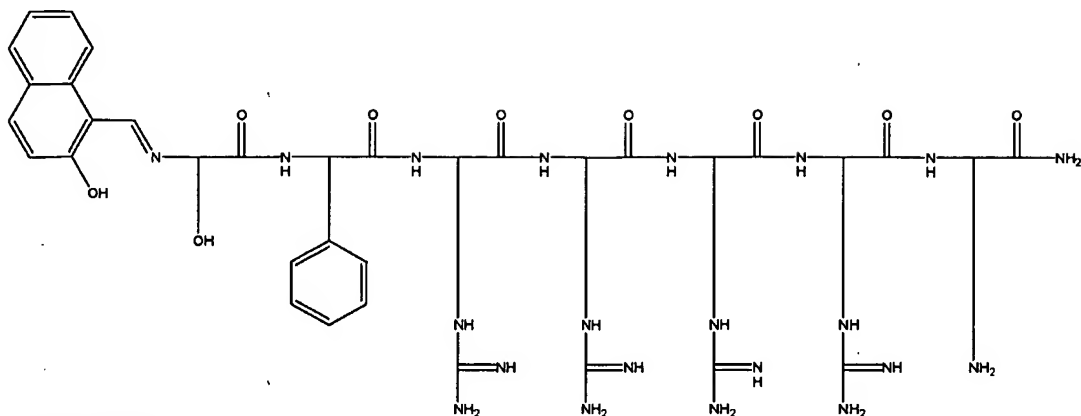
Compound 51

Applicant: David S. Lawrence

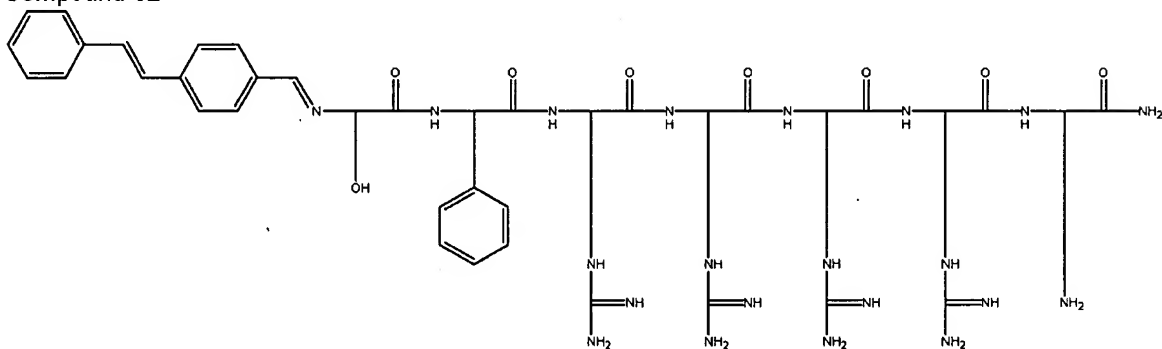
Serial No.: 10/755,086

Filed: January 9, 2004

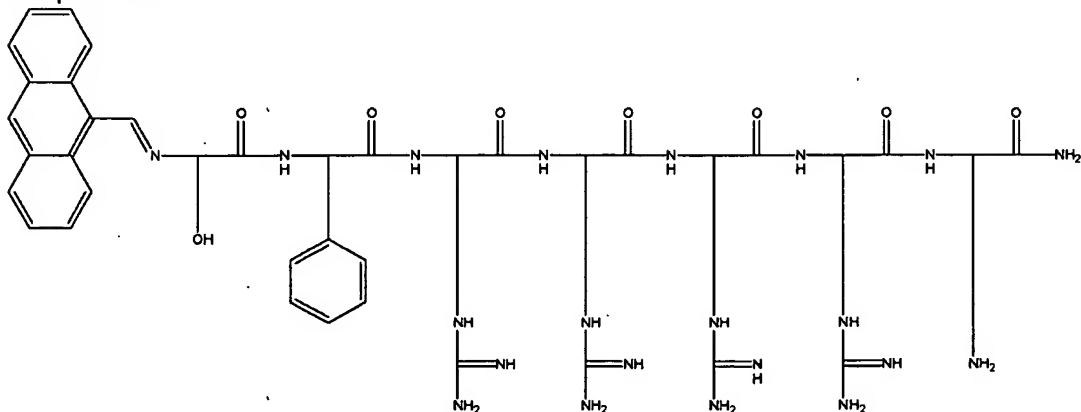
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Compound 52



Compound 53



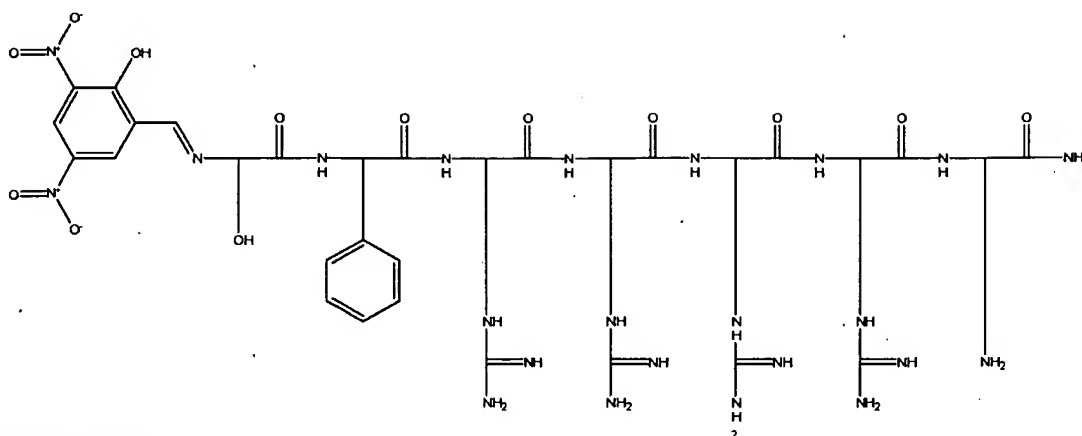
Compound 54

Applicant: David S. Lawrence

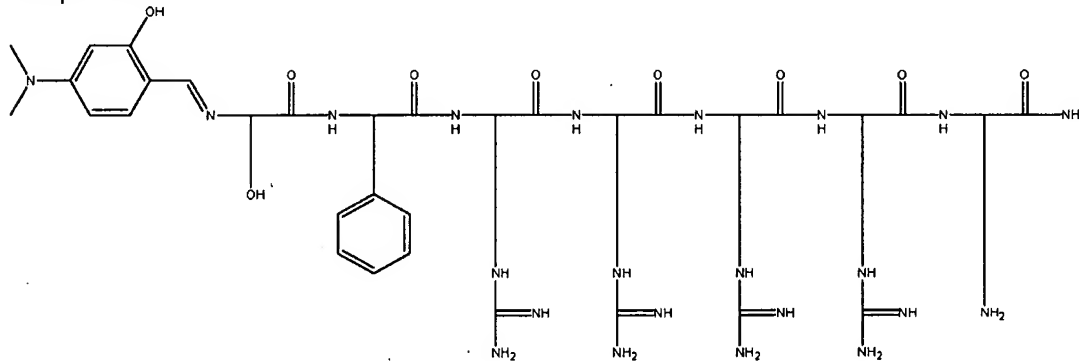
Serial No.: 10/755,086

Filed: January 9, 2004

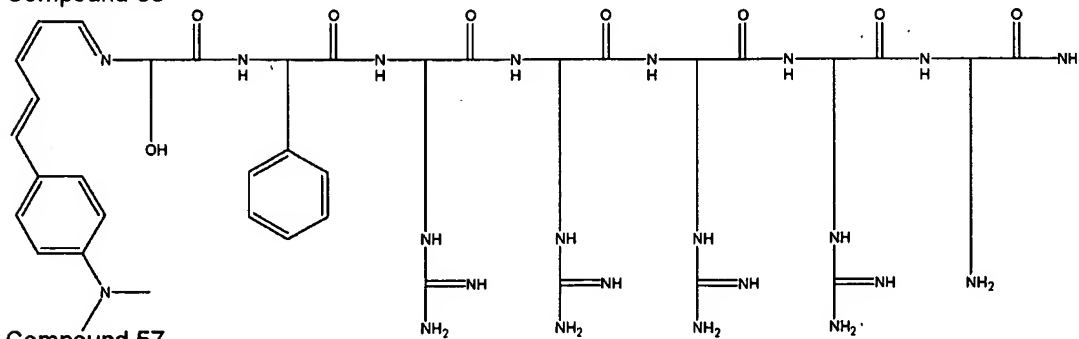
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Compound 55



Compound 56



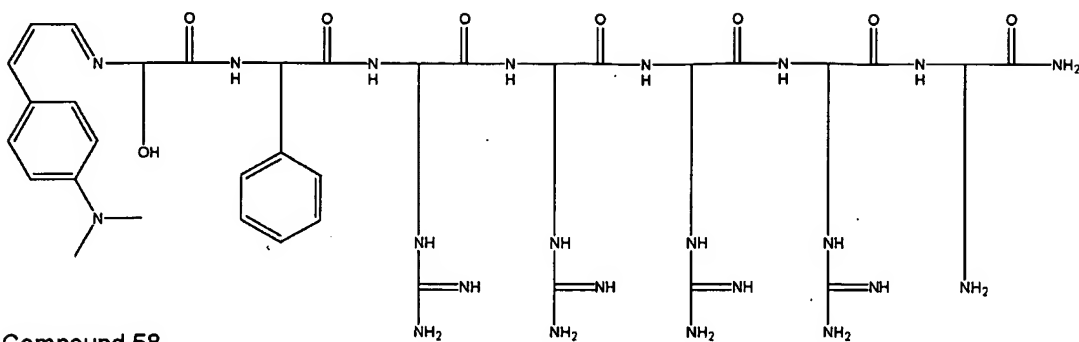
Compound 57

Applicant: David S. Lawrence

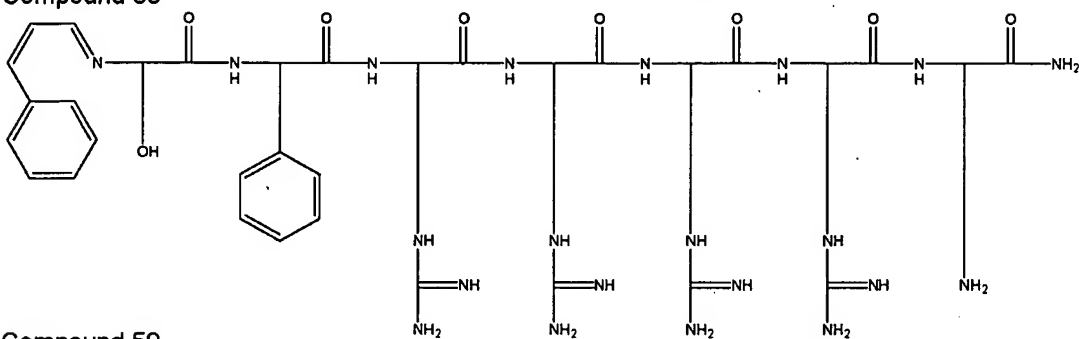
Serial No.: 10/755,086

Filed: January 9, 2004

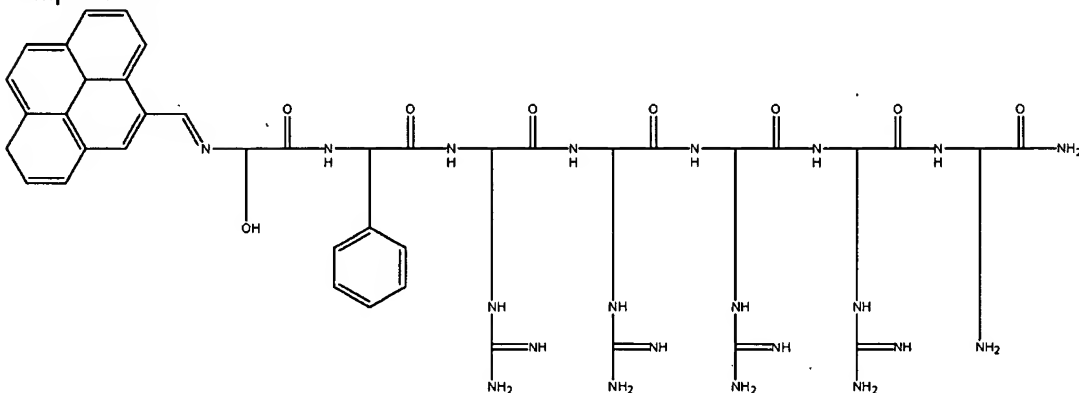
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Compound 58



Compound 59



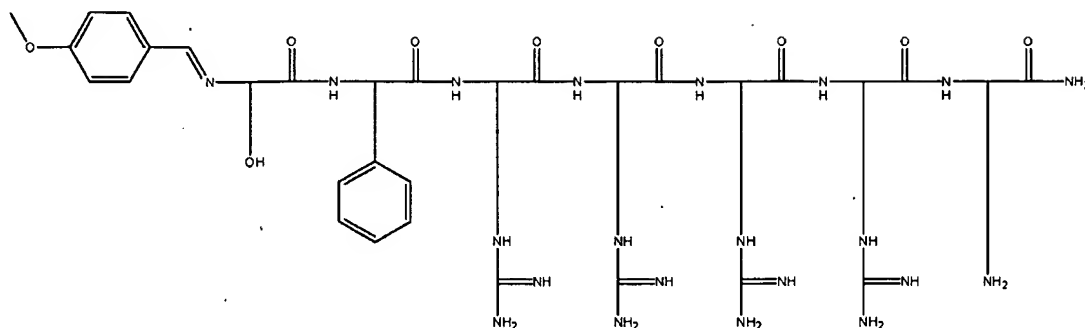
Compound 60

Applicant: David S. Lawrence

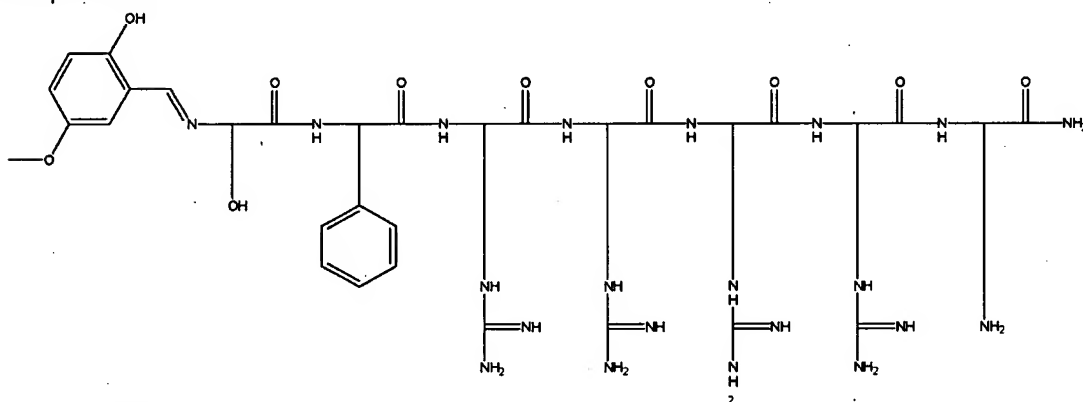
Serial No.: 10/755,086

Filed: January 9, 2004

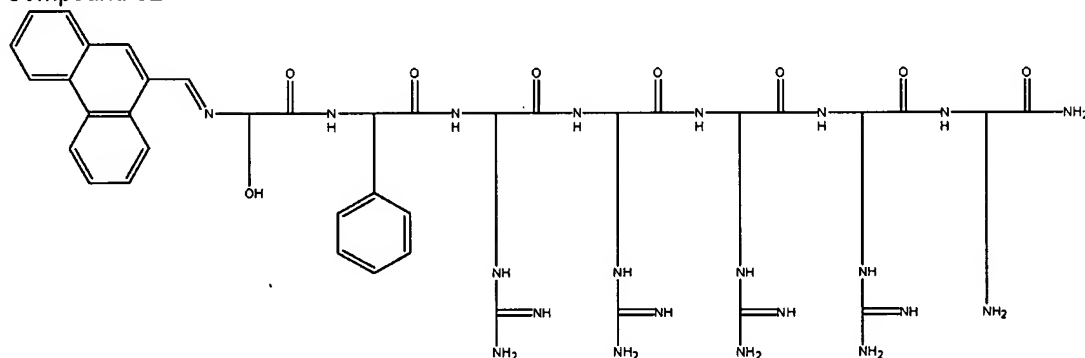
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Compound 61



Compound 62



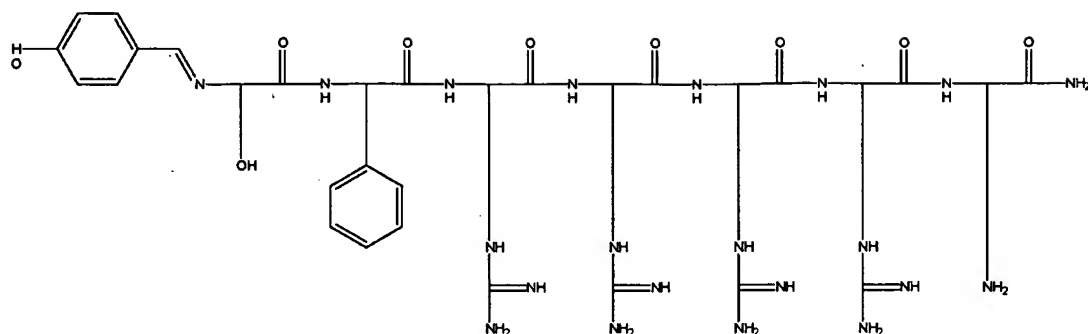
Compound 63

Applicant: David S. Lawrence

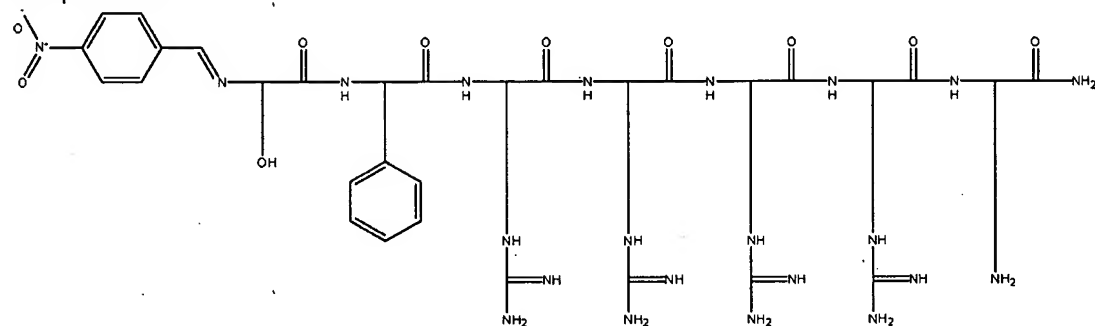
Serial No.: 10/755,086

Filed: January 9, 2004

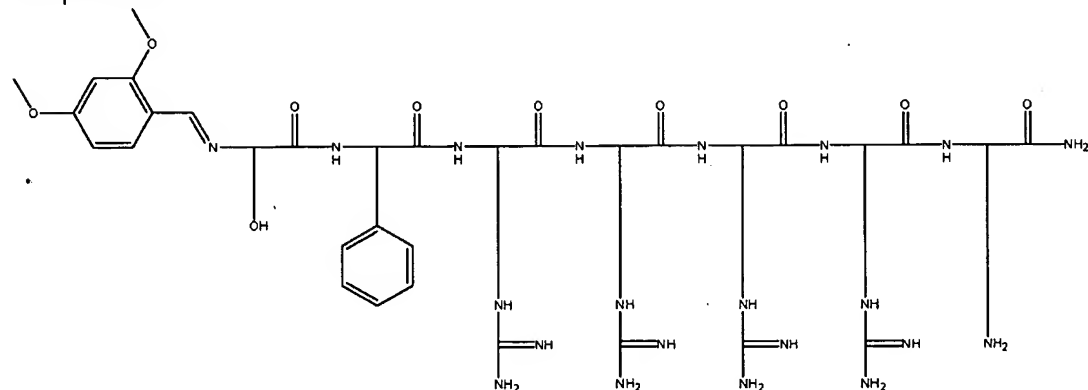
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Compound 64



Compound 65



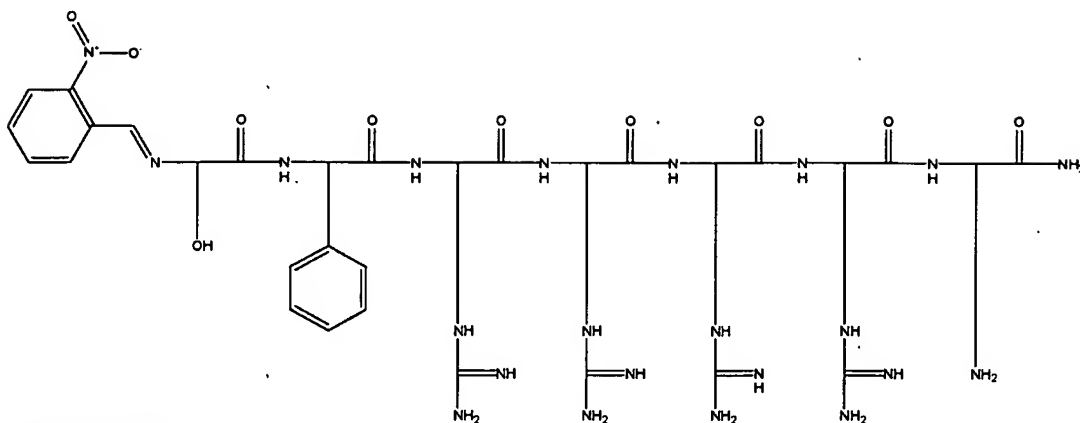
Compound 66

Applicant: David S. Lawrence

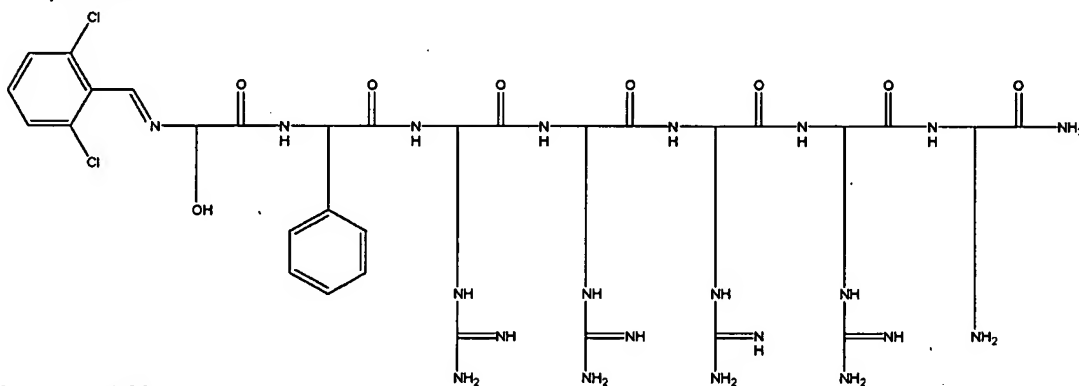
Serial No.: 10/755,086

Filed: January 9, 2004

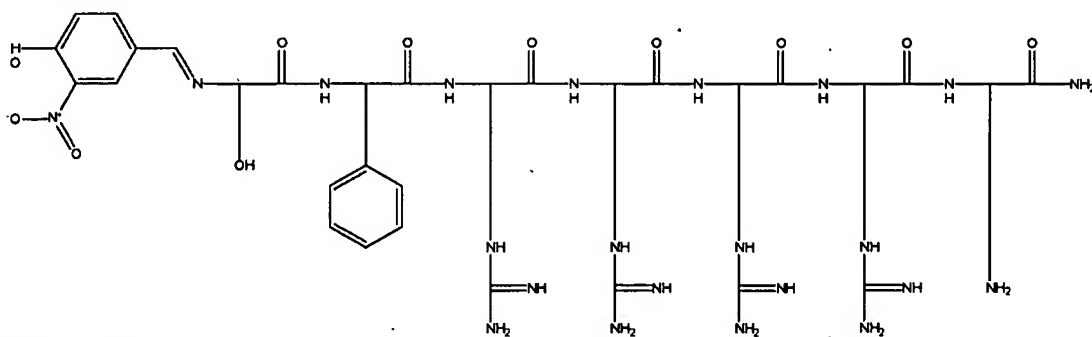
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Compound 67

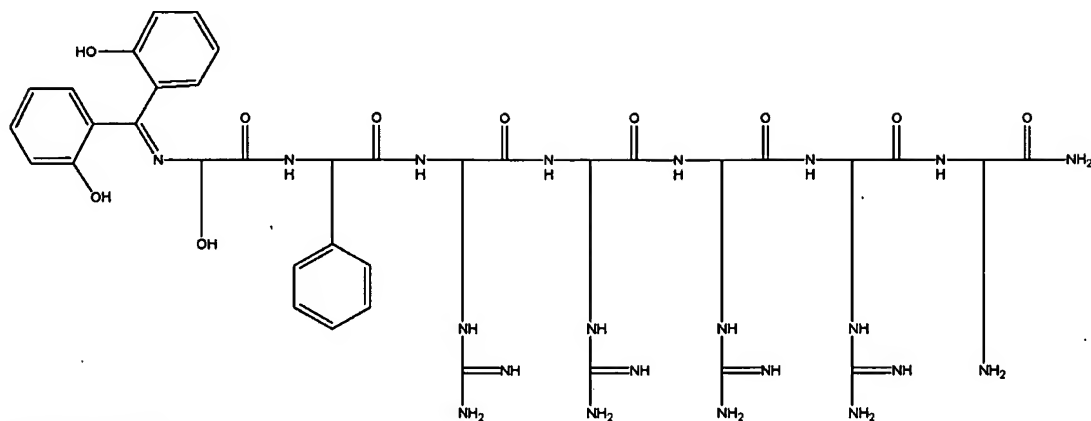


Compound 68

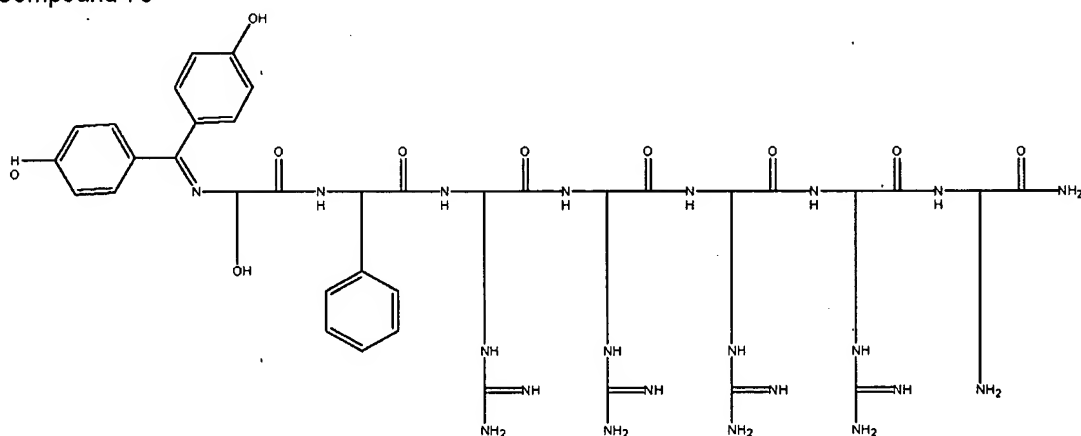


Compound 69

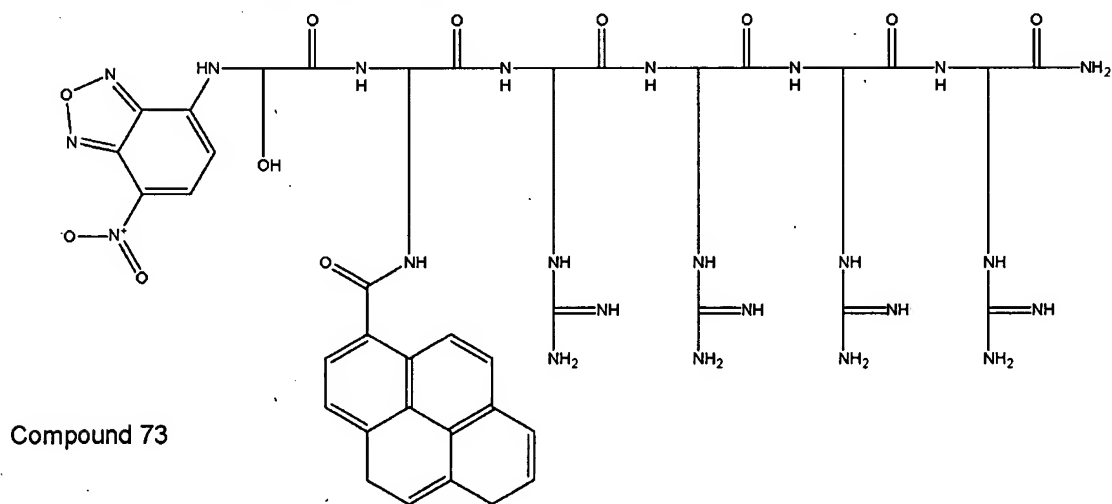
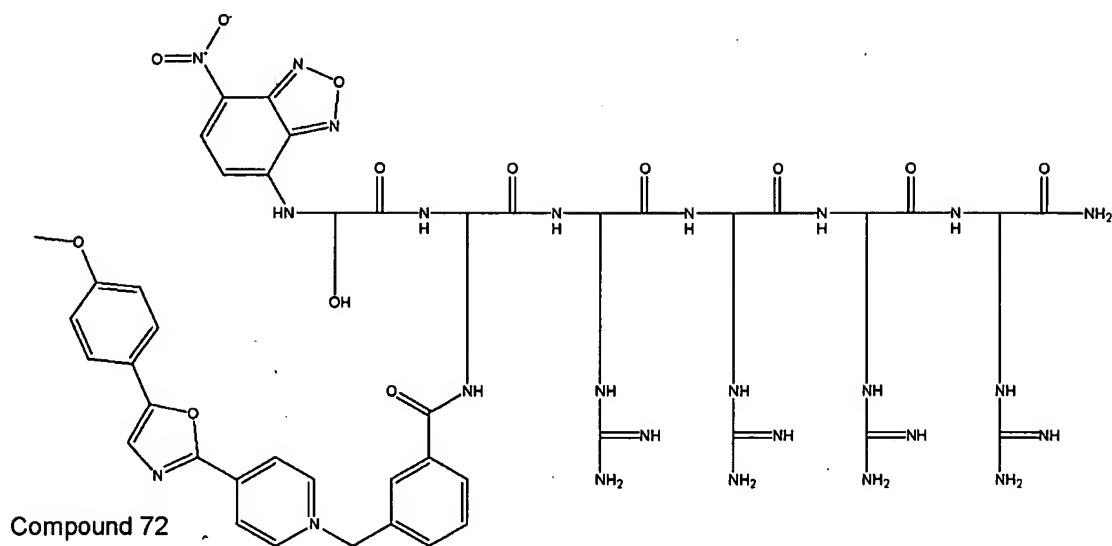
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Compound 70



Compound 71

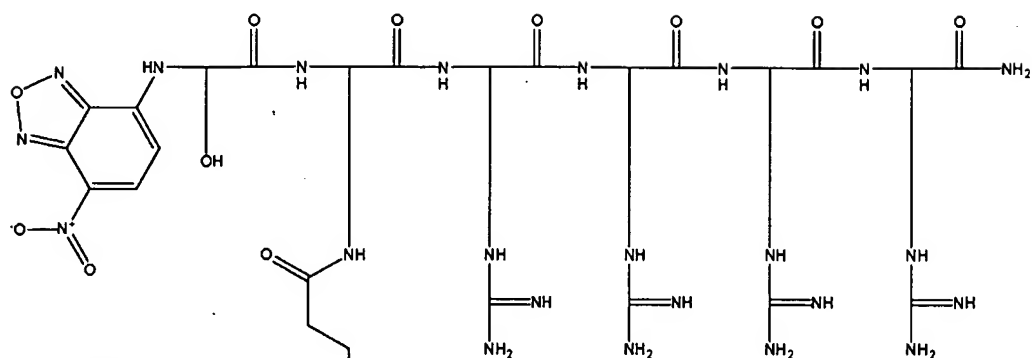


Applicant: David S. Lawrence

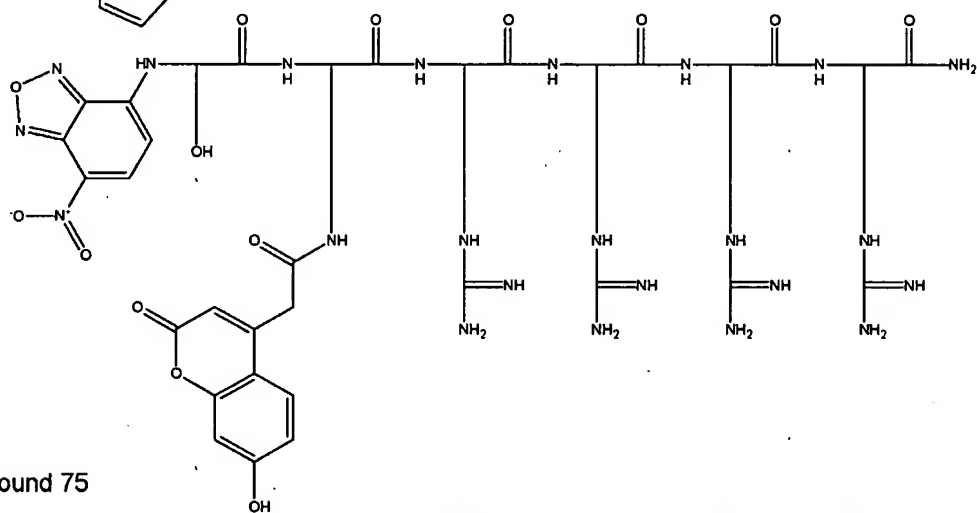
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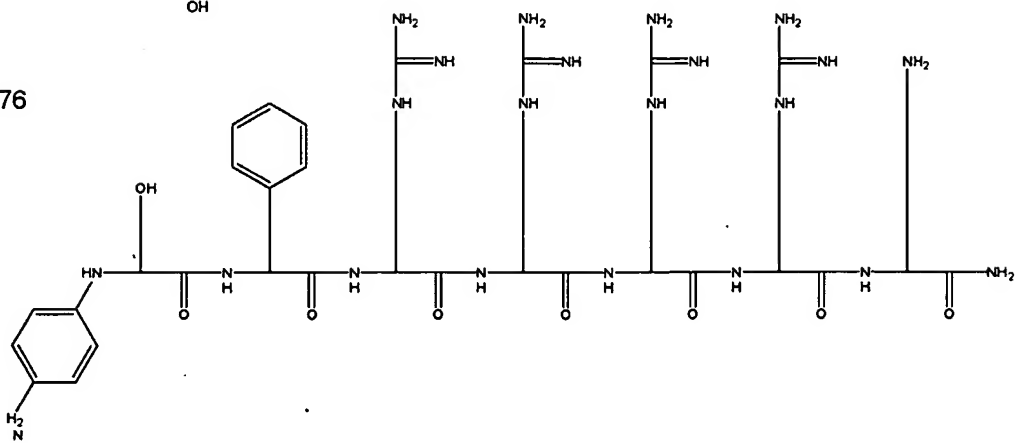


Compound 74

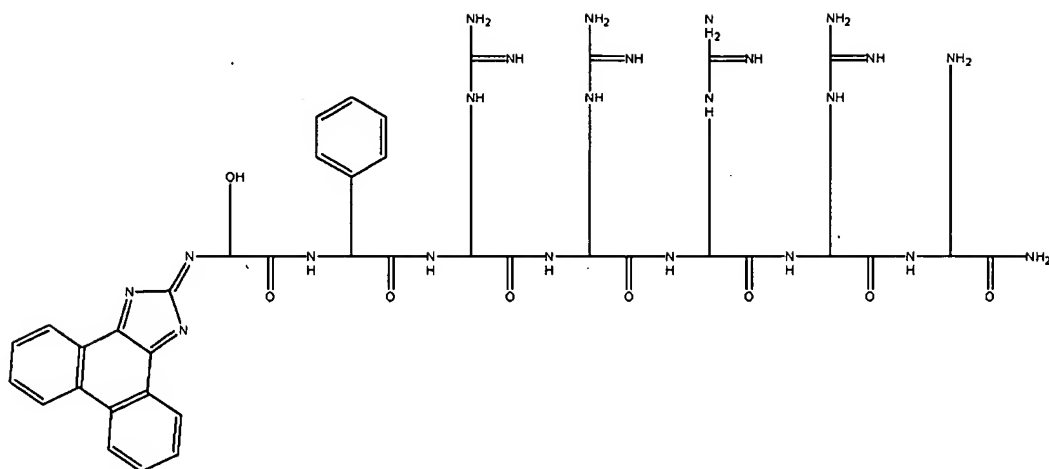


Compound 75

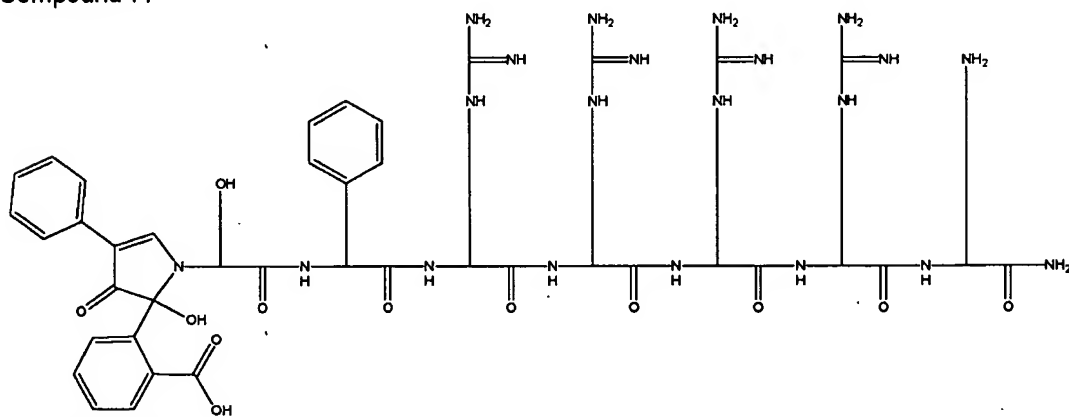
Compound 76



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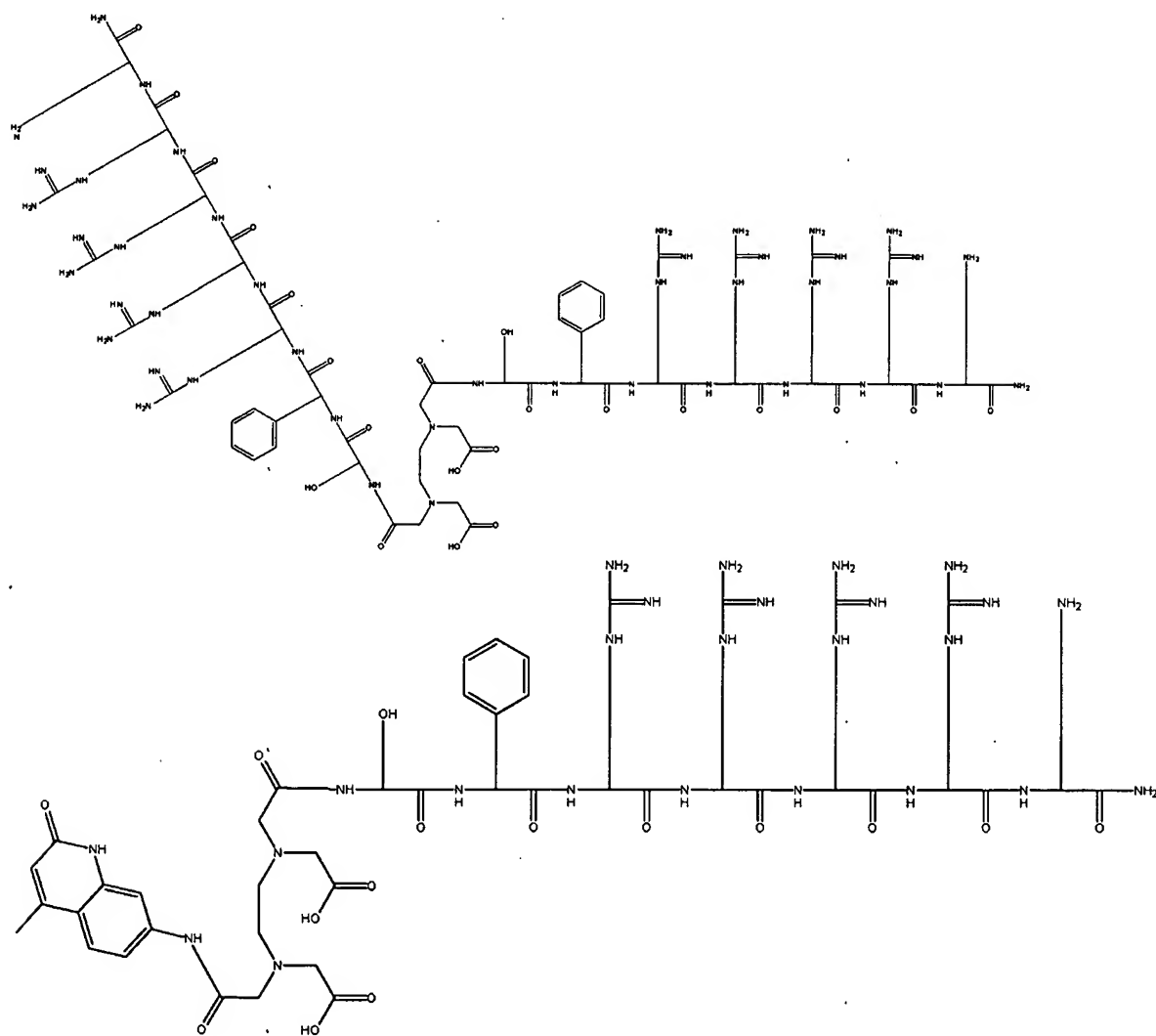
Compound 77



Compound 78

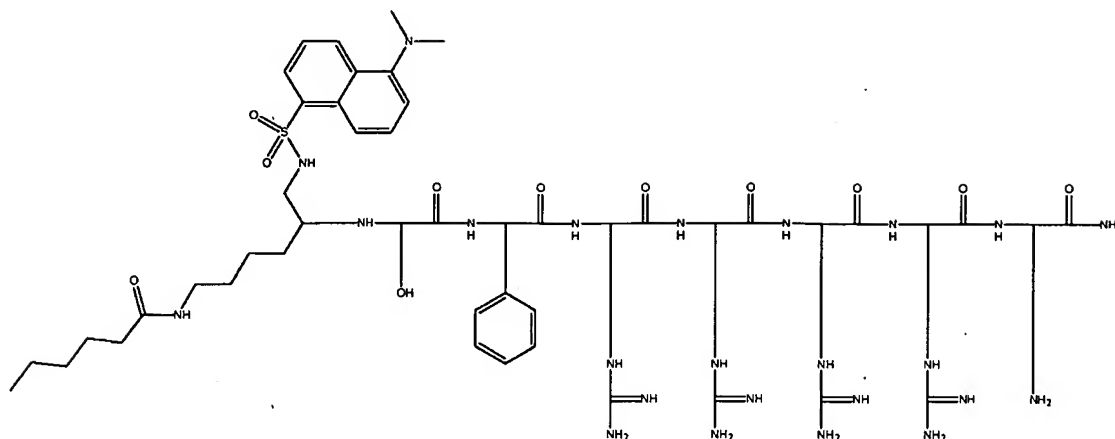
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Compound 79



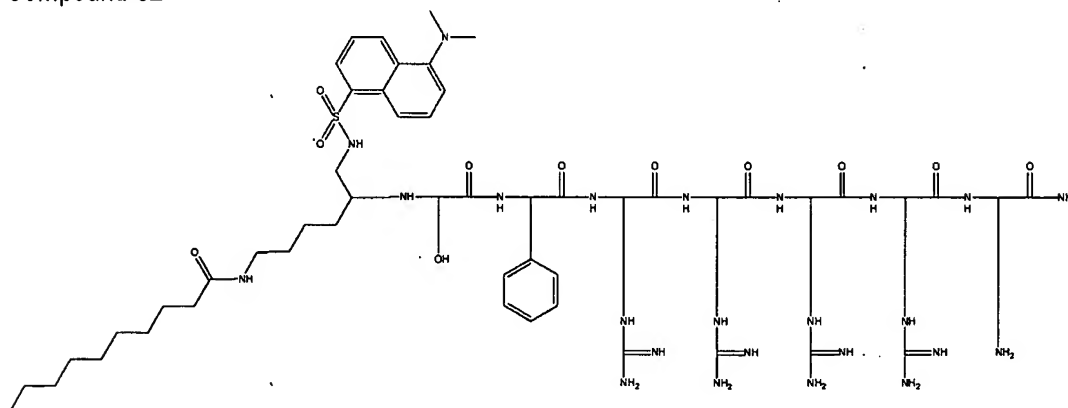
Compound 80

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Compound 81

Compound 82

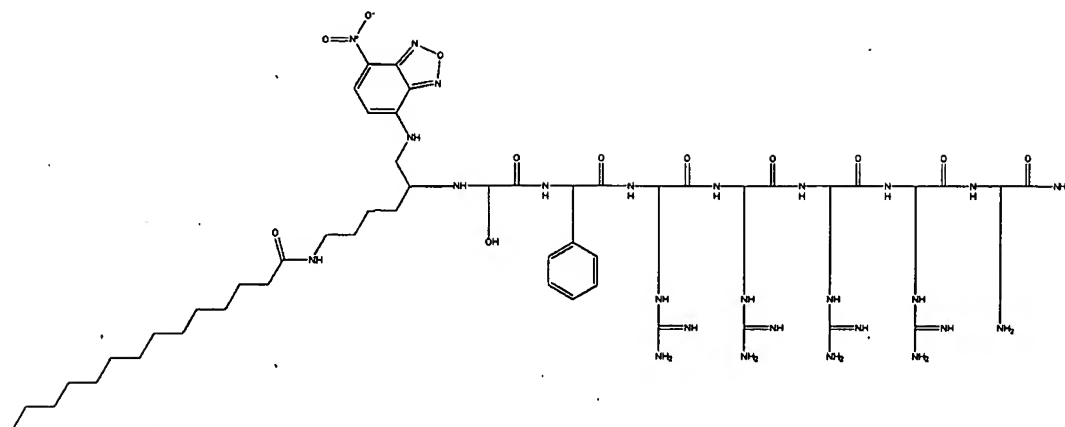


Applicant: David S. Lawrence

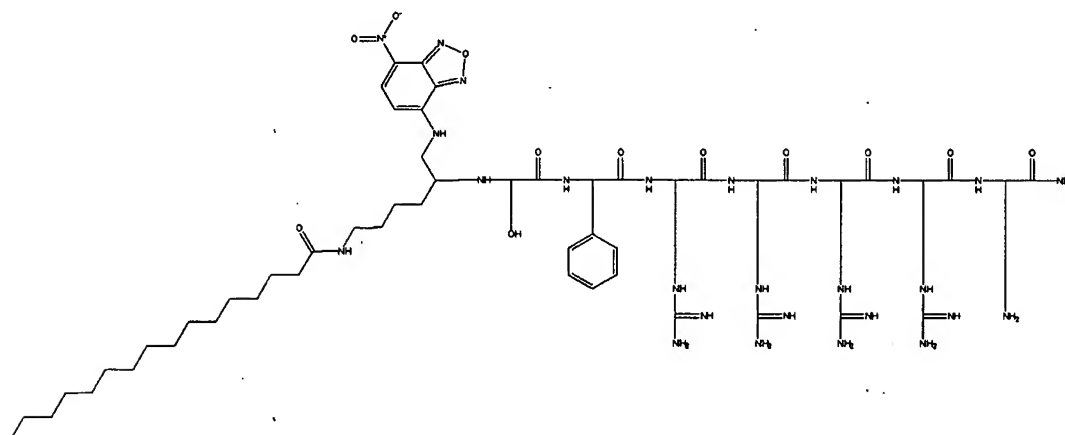
Serial No.: 10/755,086

Filed: January 9, 2004

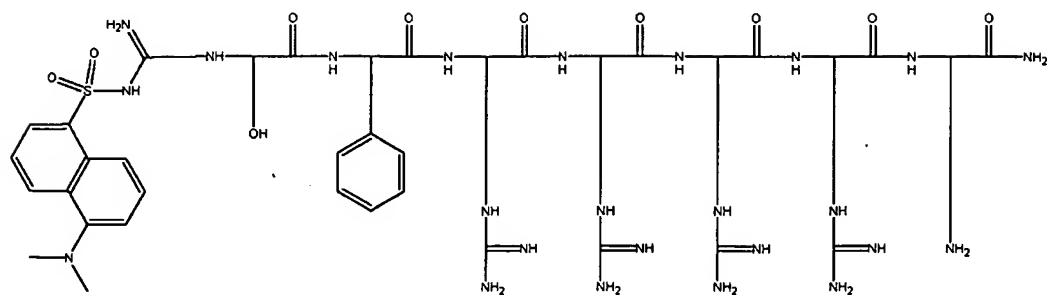
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Compound 83

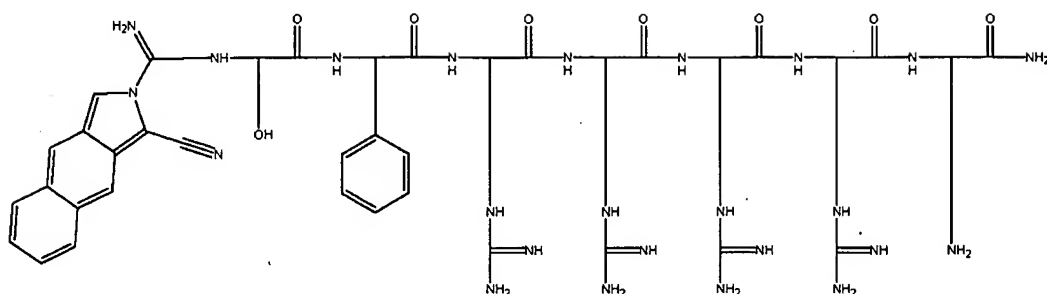


Compound 84

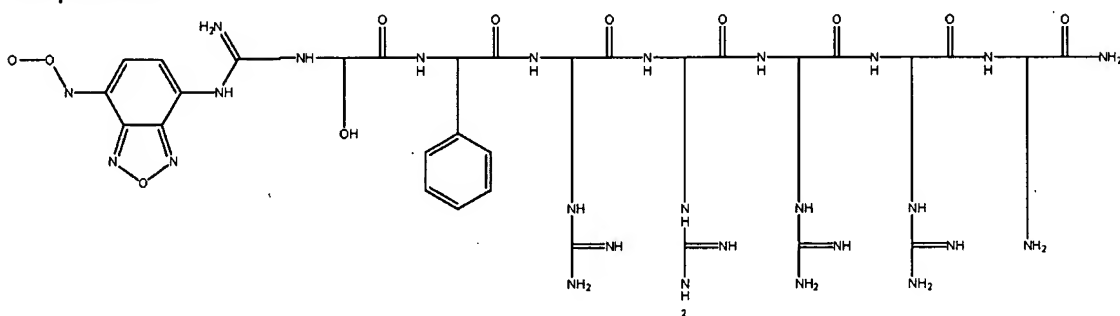


Compound 85

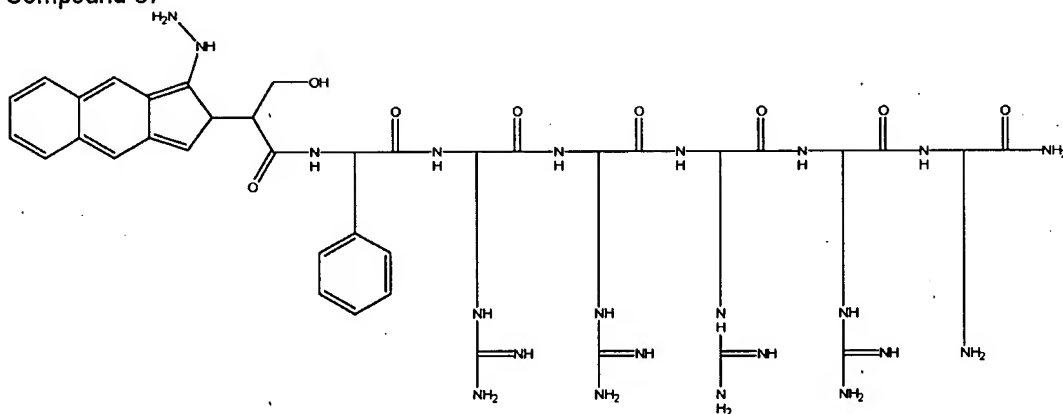
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Compound 86



Compound 87



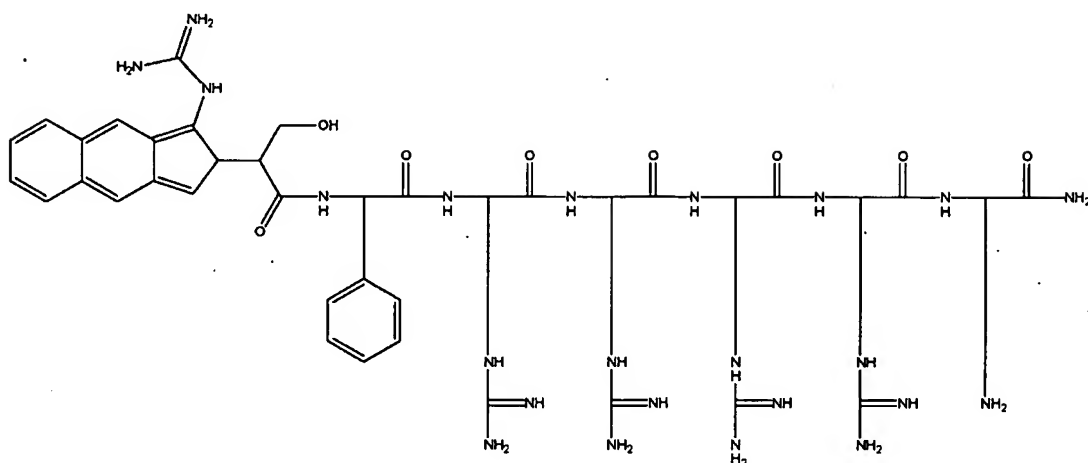
Compound 88

Applicant: David S. Lawrence

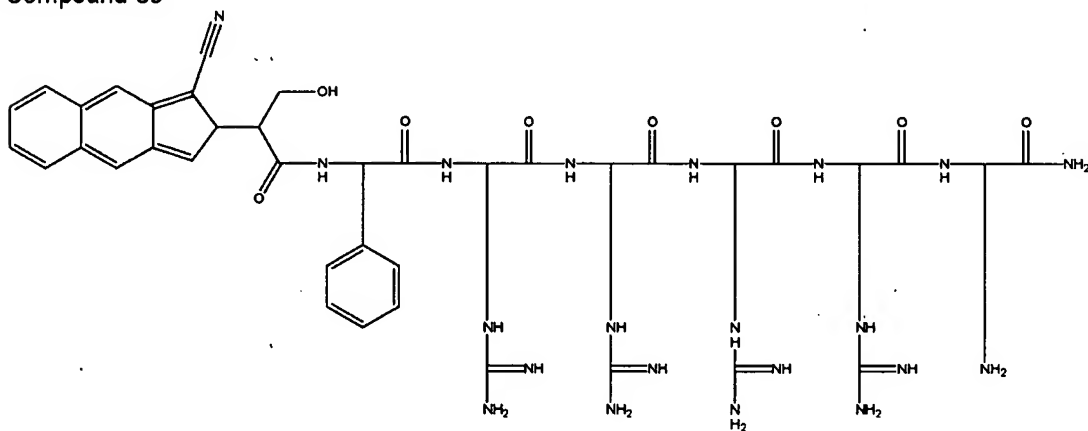
Serial No.: 10/755,086

Filed: January 9, 2004

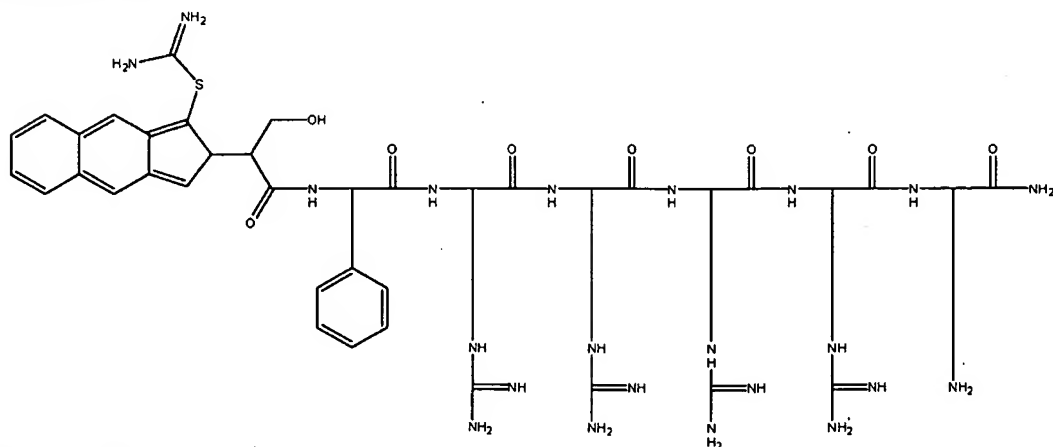
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Compound 89

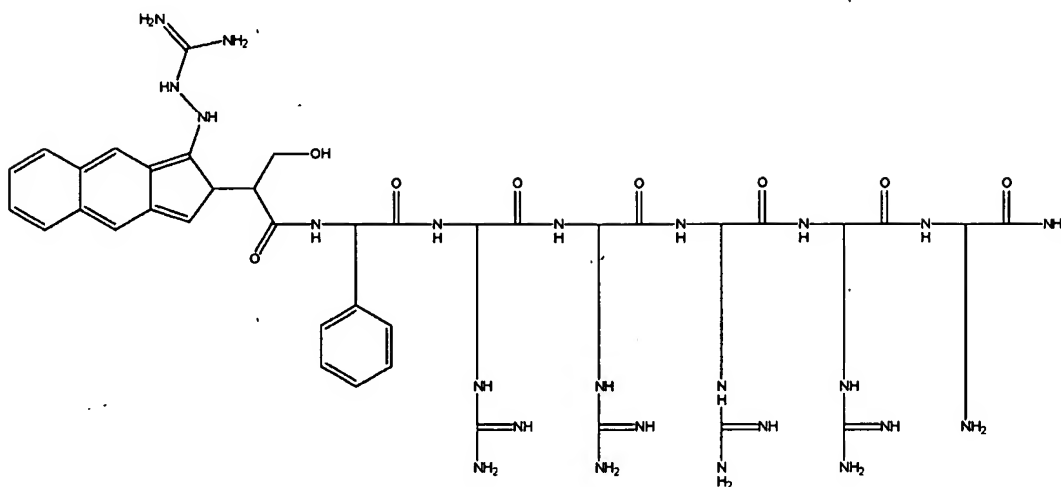


Compound 90

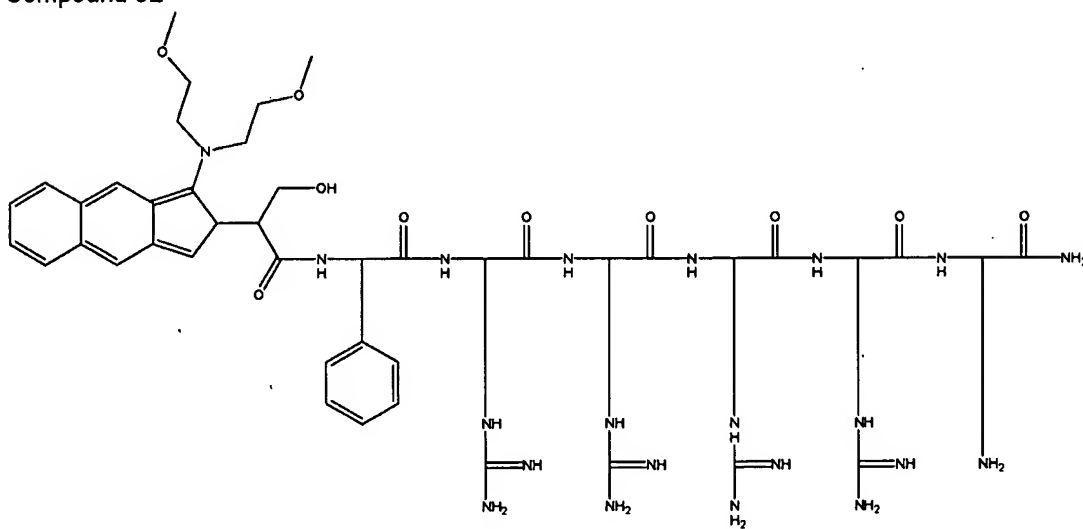


Compound 91

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Compound 92



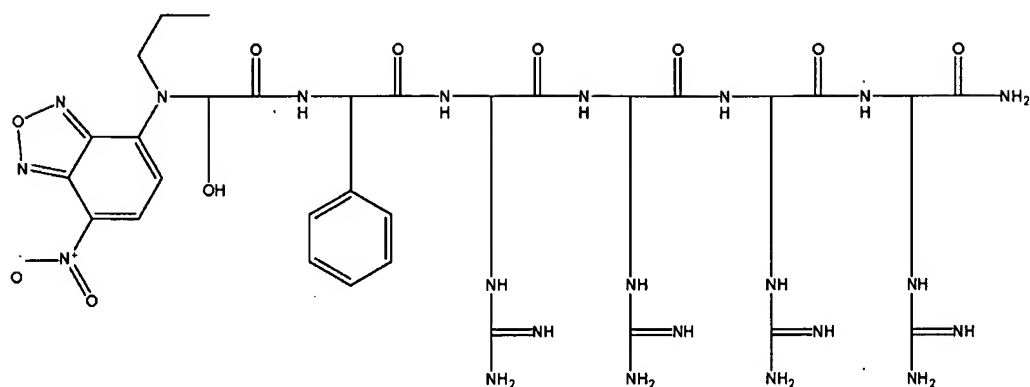
Compound 93

Applicant: David S. Lawrence

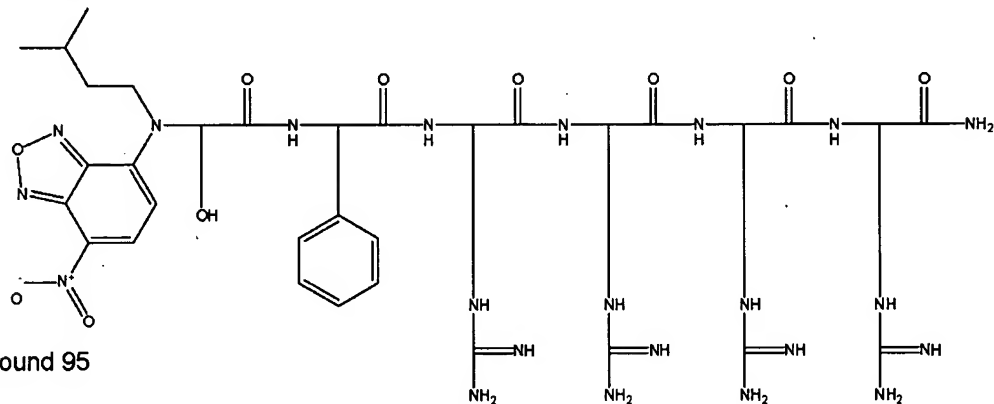
Serial No.: 10/755,086

Filed: January 9, 2004

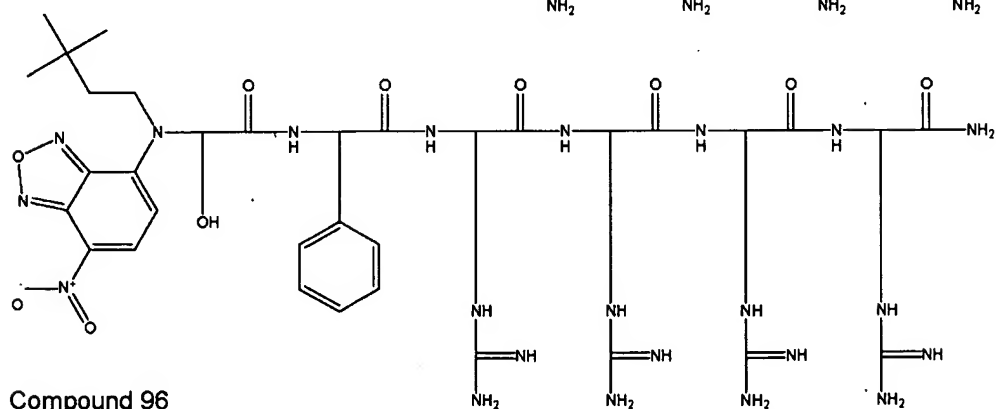
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Compound 94



Compound 95

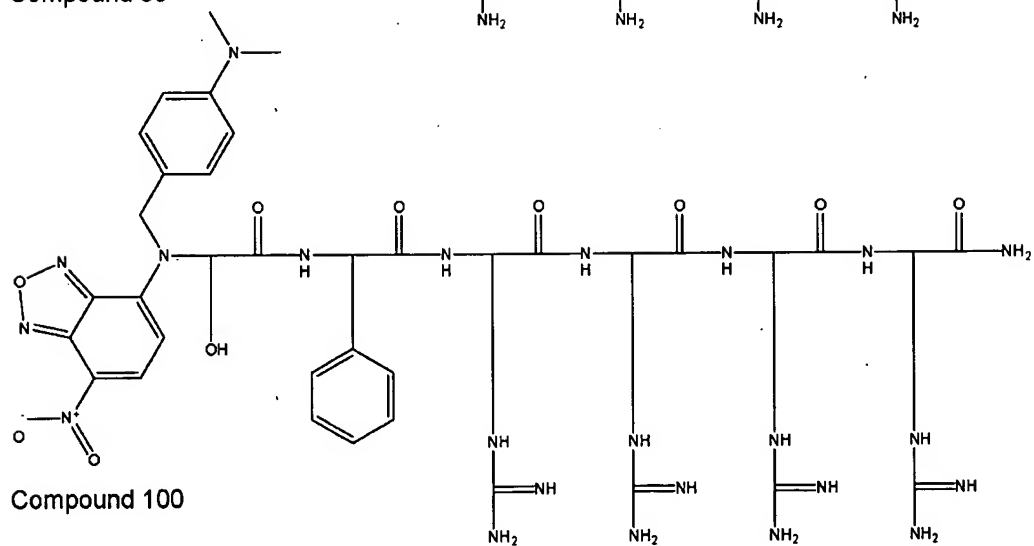
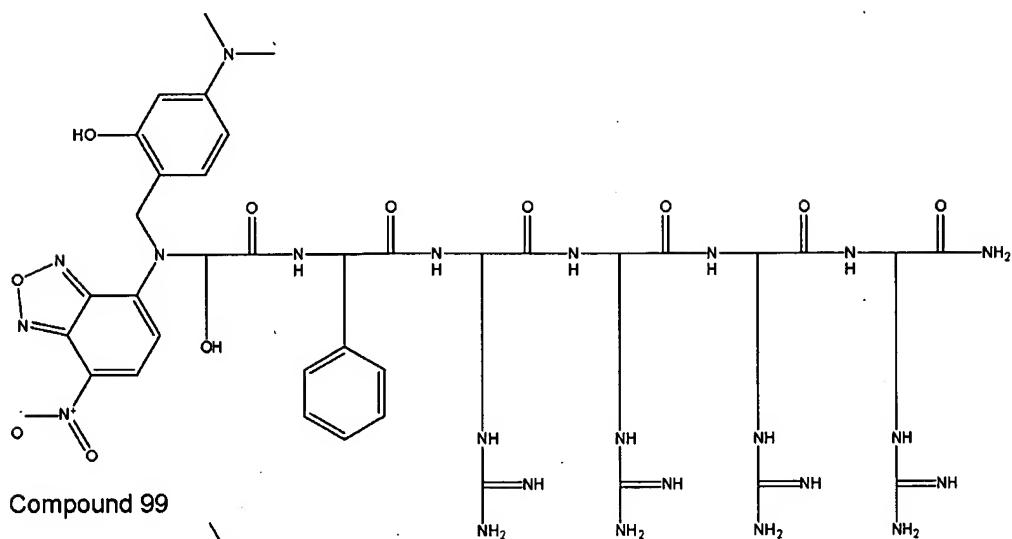


Compound 96

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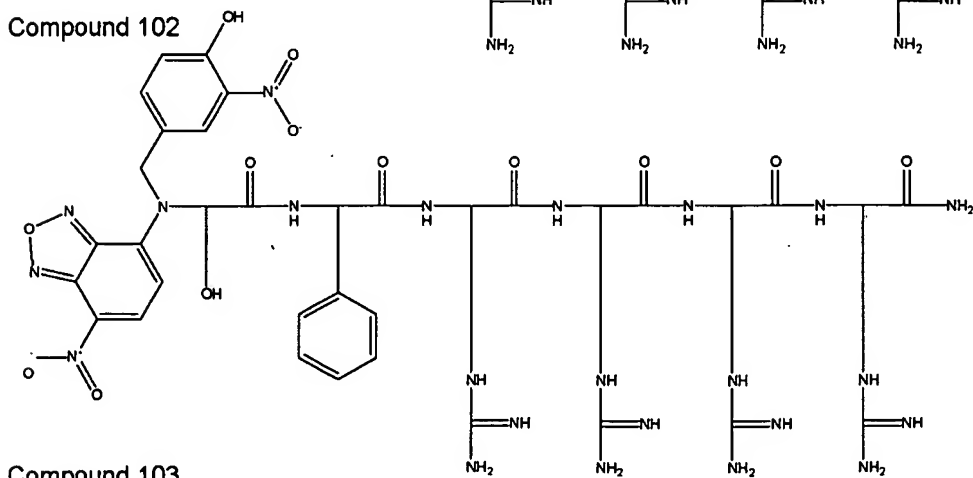
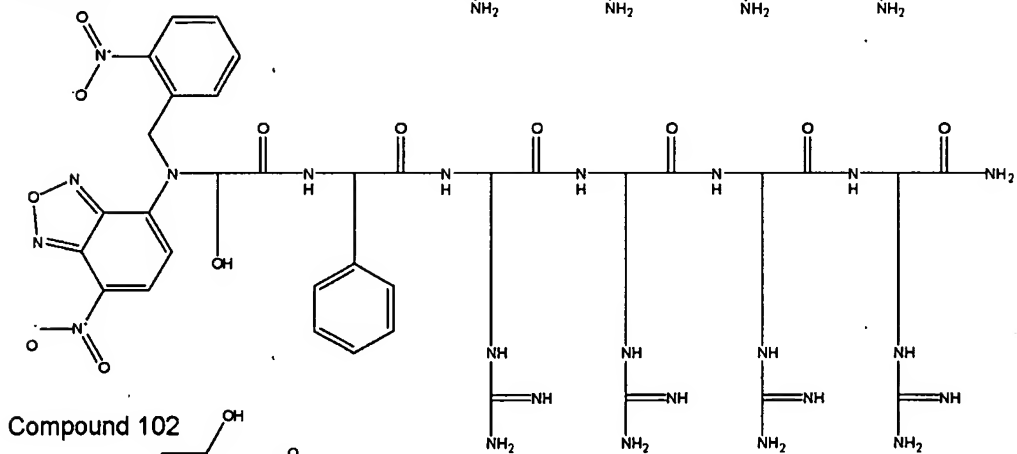
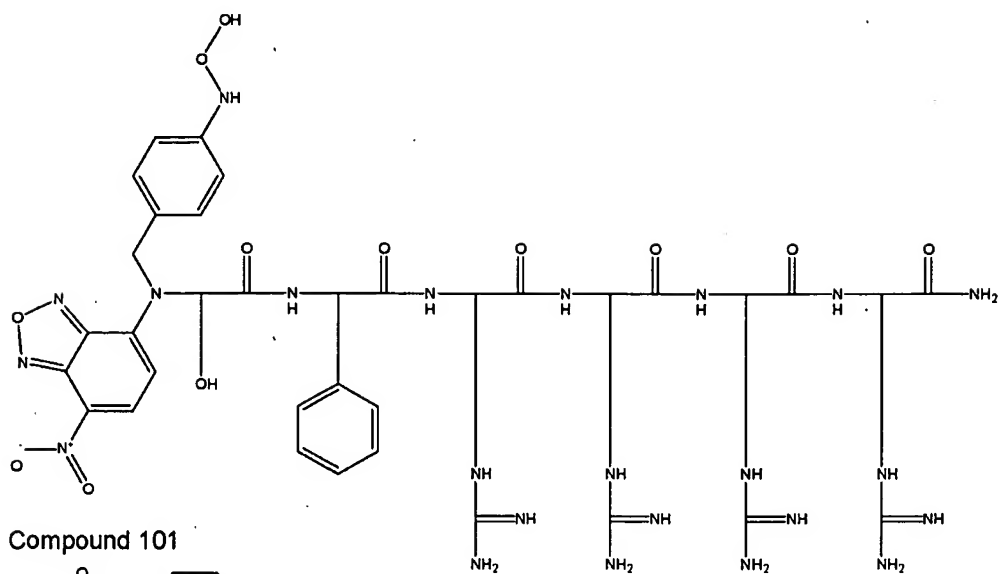


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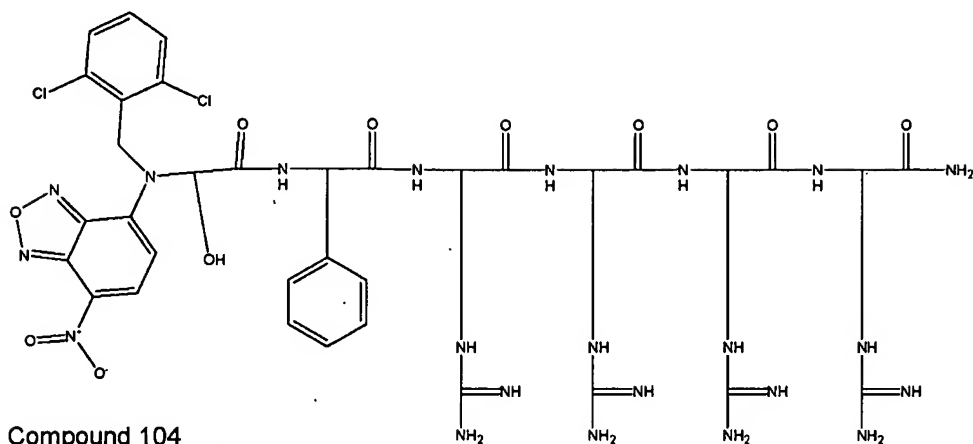


Applicant: David S. Lawrence

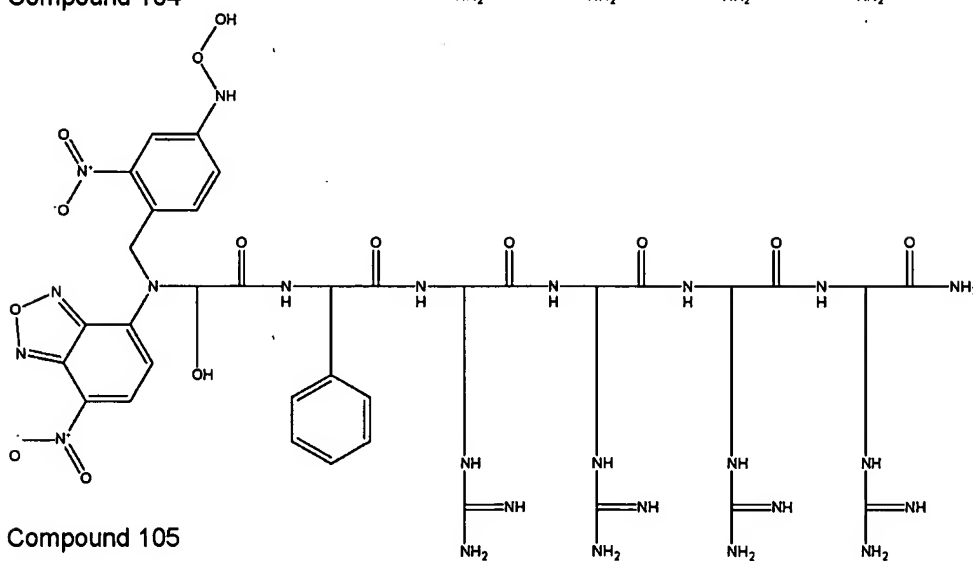
Serial No.: 10/755,086

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Compound 104



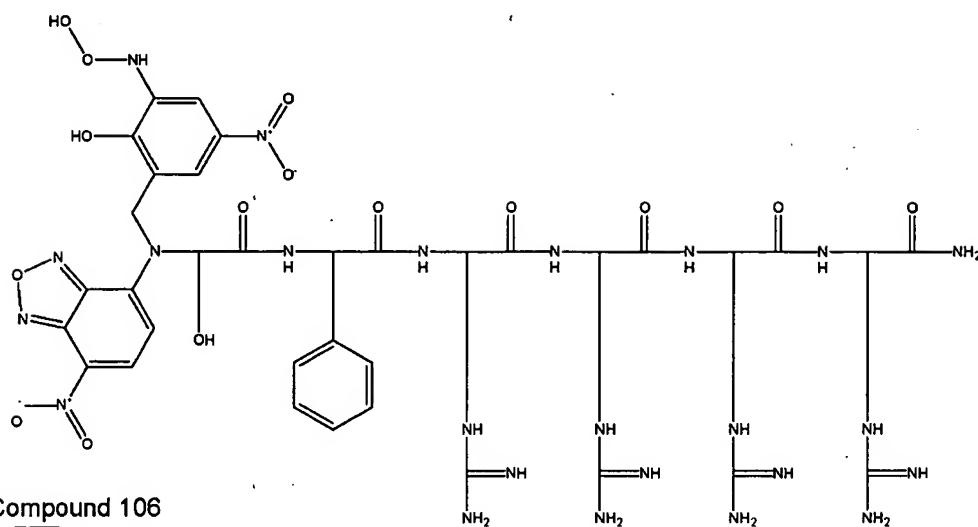
Compound 105

Applicant: David S. Lawrence

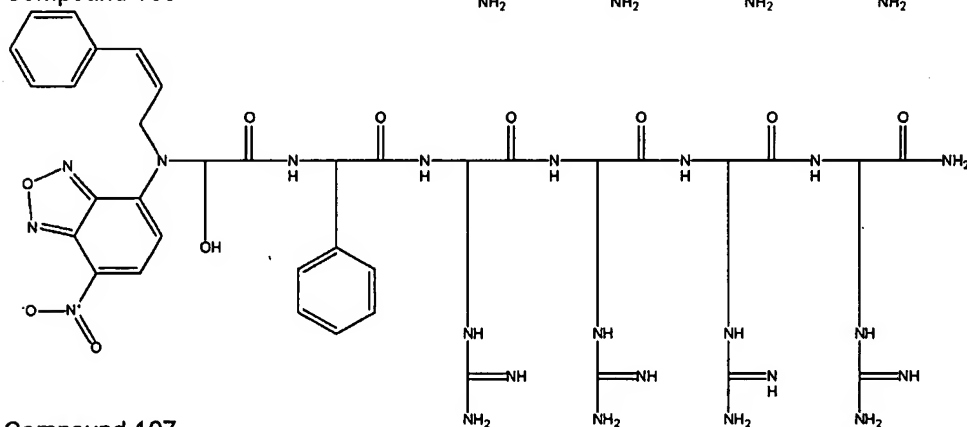
Serial No.: 10/755,086

Filed: January 9, 2004

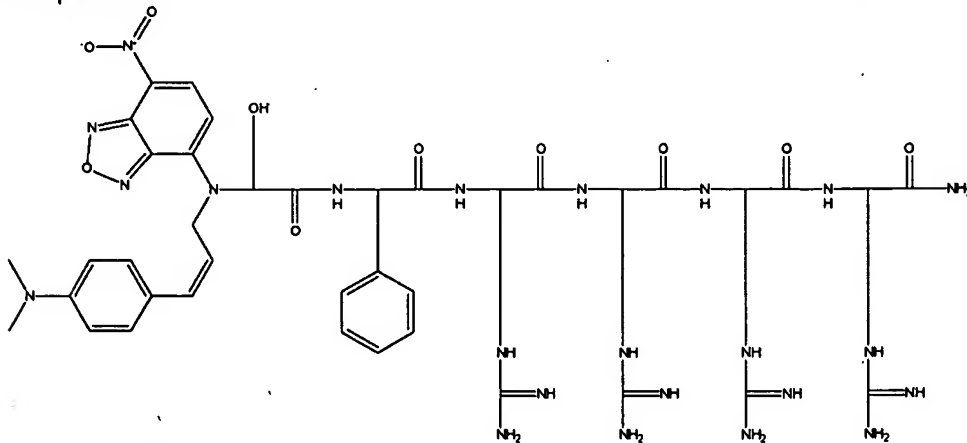
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Compound 106

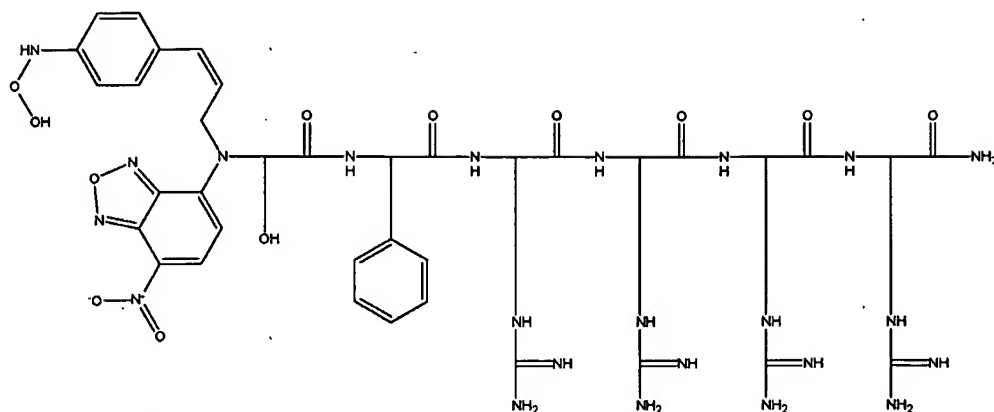


Compound 107

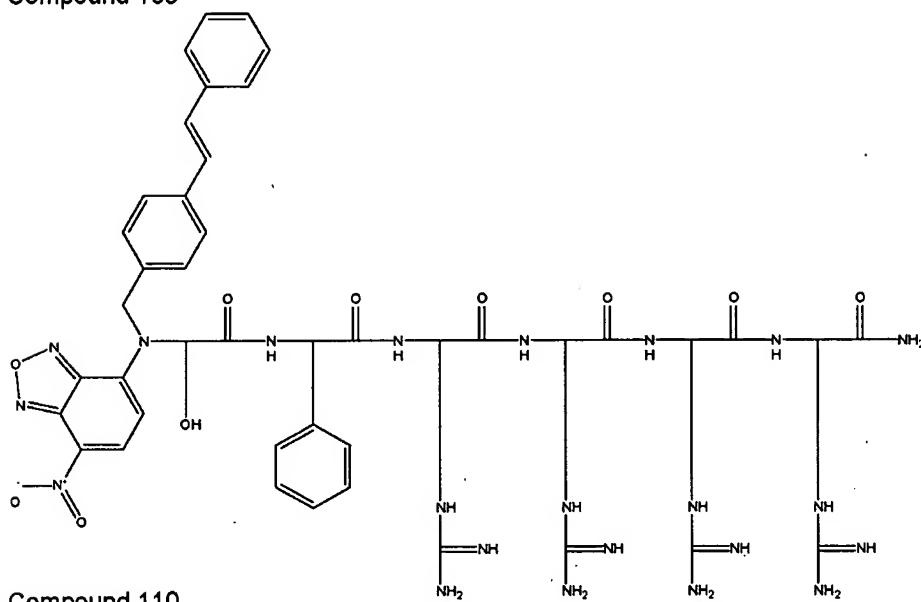


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Compound 109



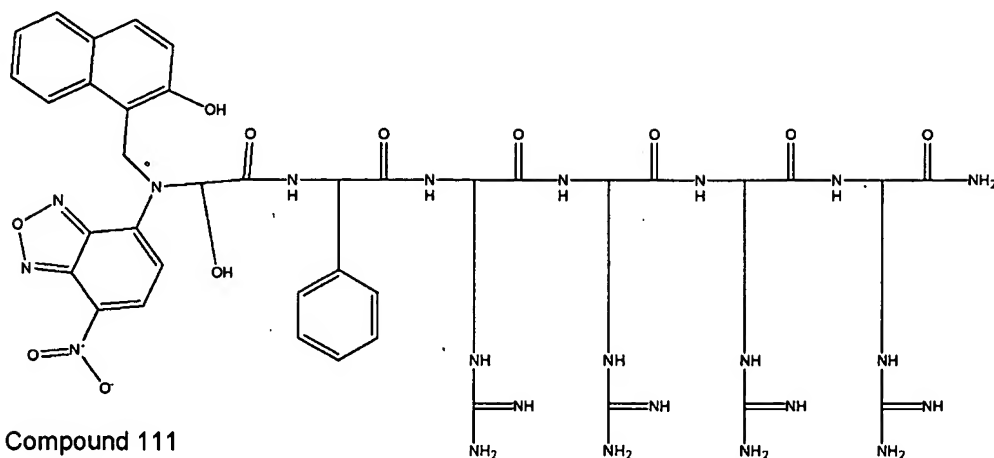
Compound 110

Applicant: David S. Lawrence

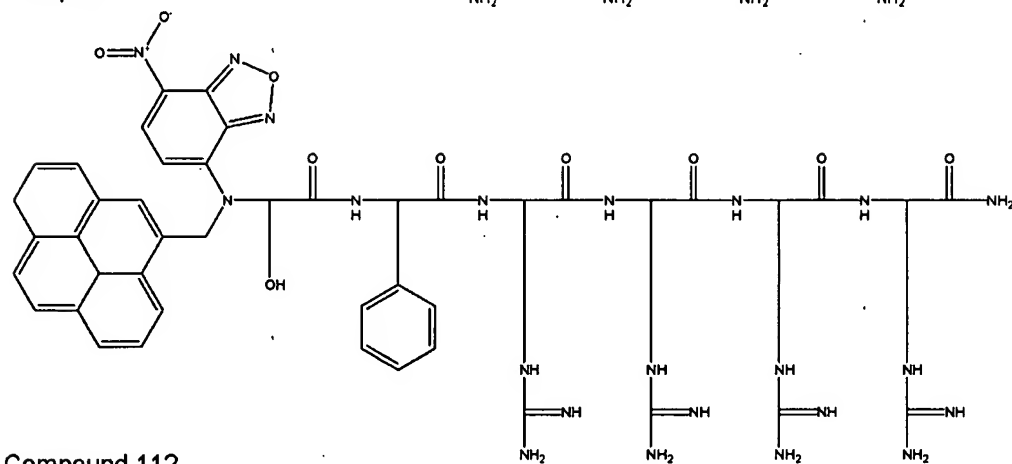
Serial No.: 10/755,086

Filed: January 9, 2004

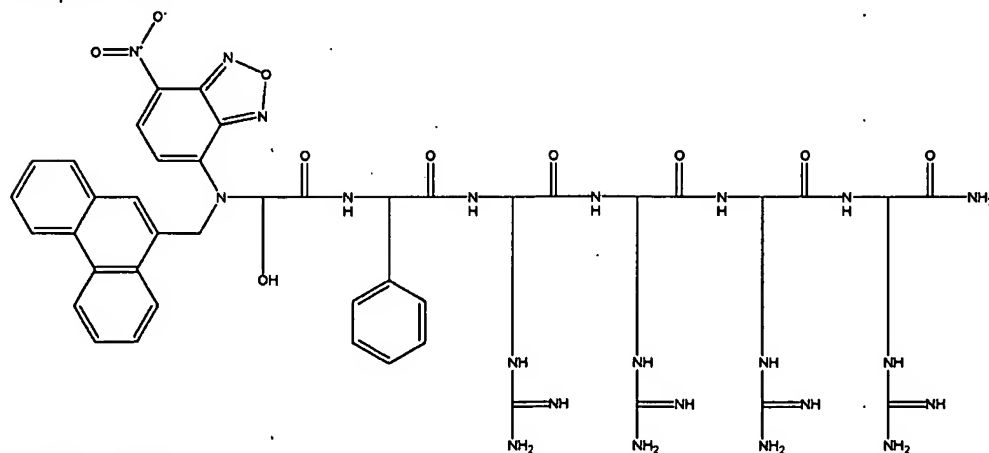
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Compound 111



Compound 112



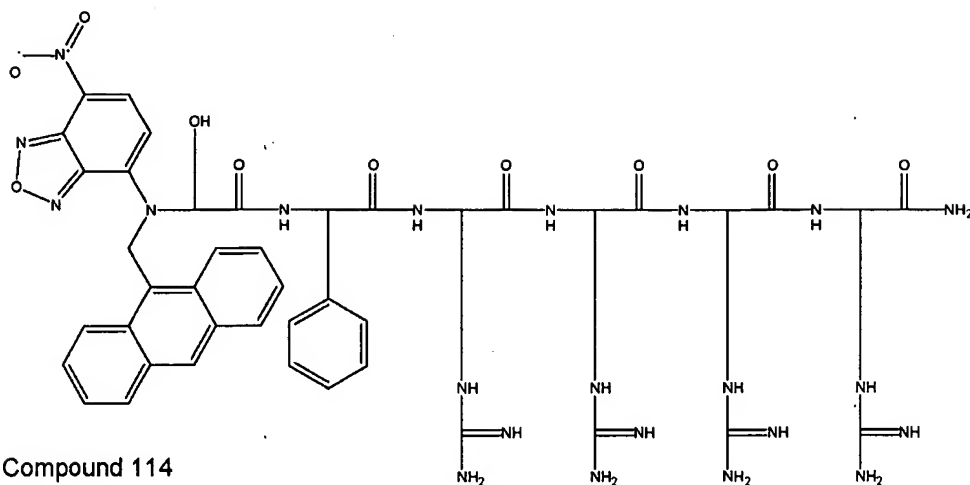
Compound 113

Applicant: David S. Lawrence

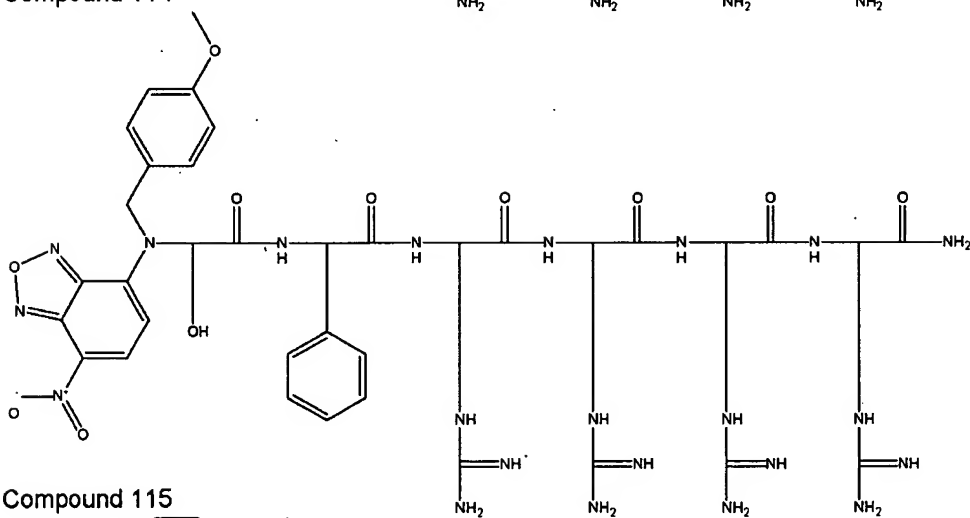
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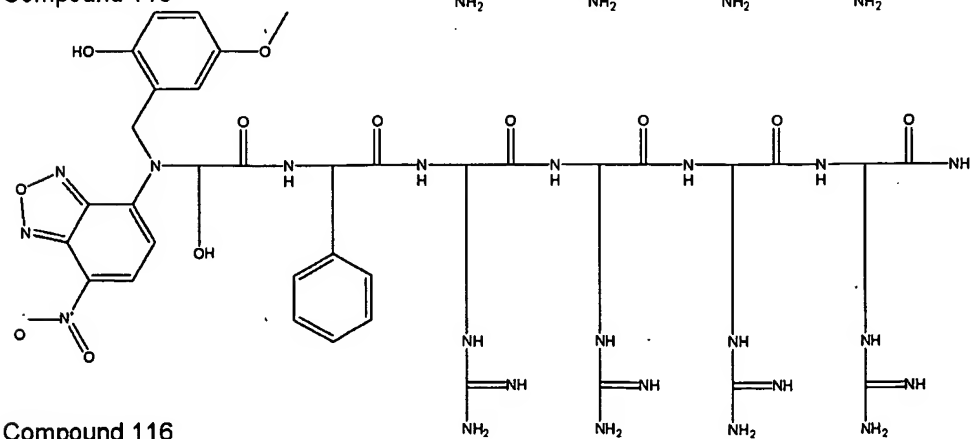
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Compound 114



Compound 115



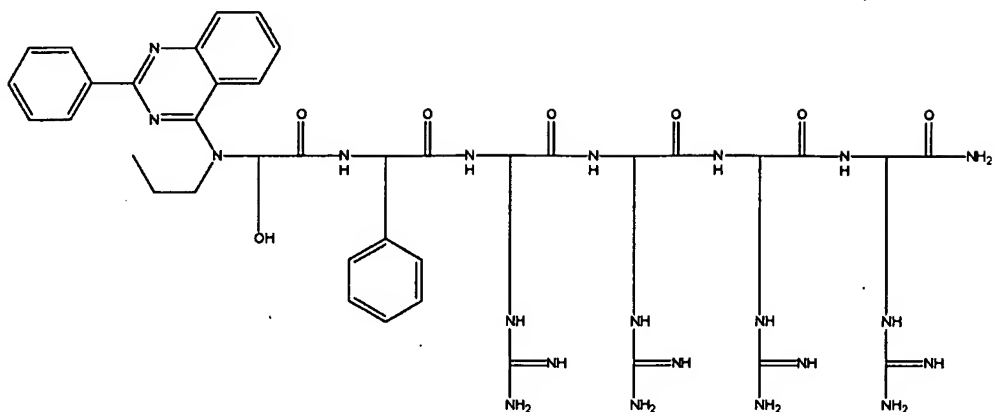
Compound 116

Applicant: David S. Lawrence

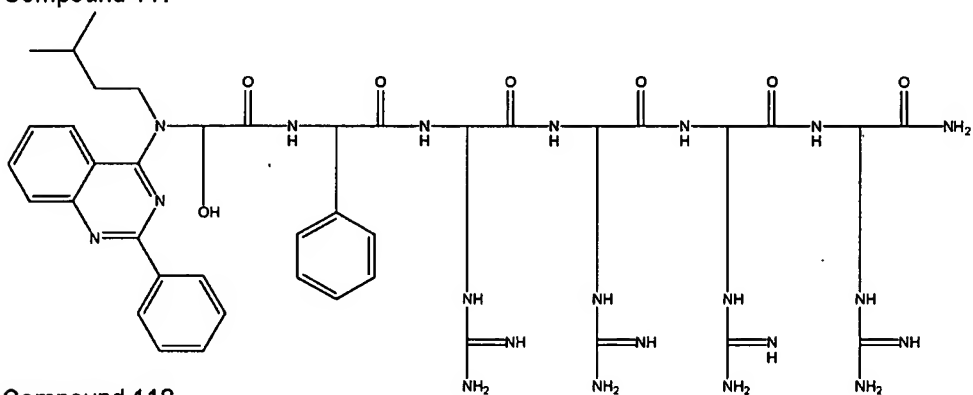
Serial No.: 10/755,086

Filed: January 9, 2004

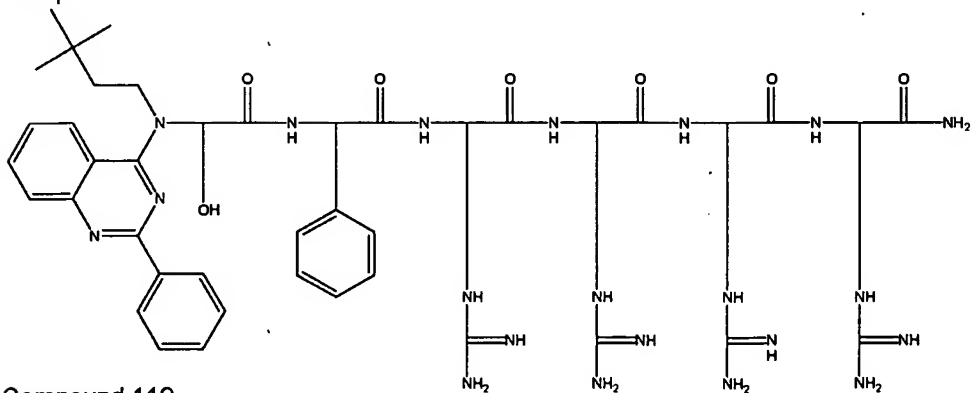
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Compound 117



Compound 118



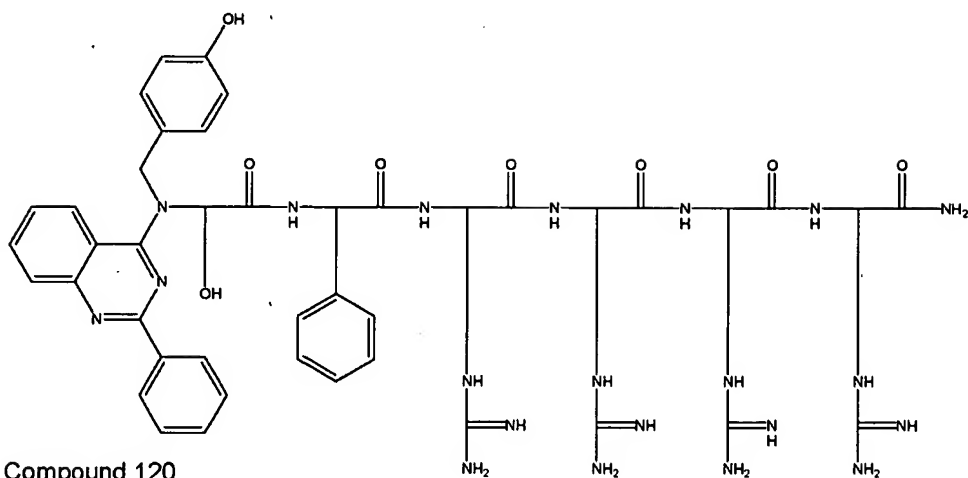
Compound 119

Applicant: David S. Lawrence

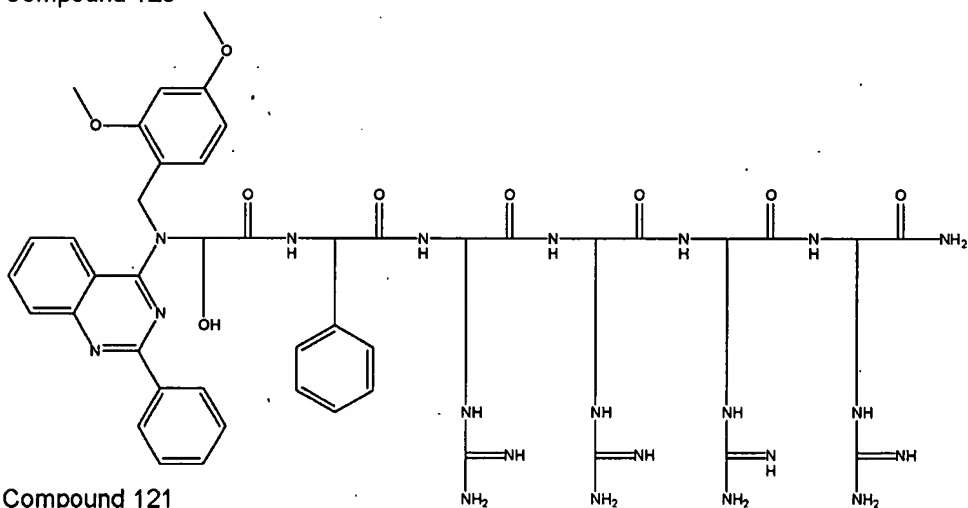
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Compound 120



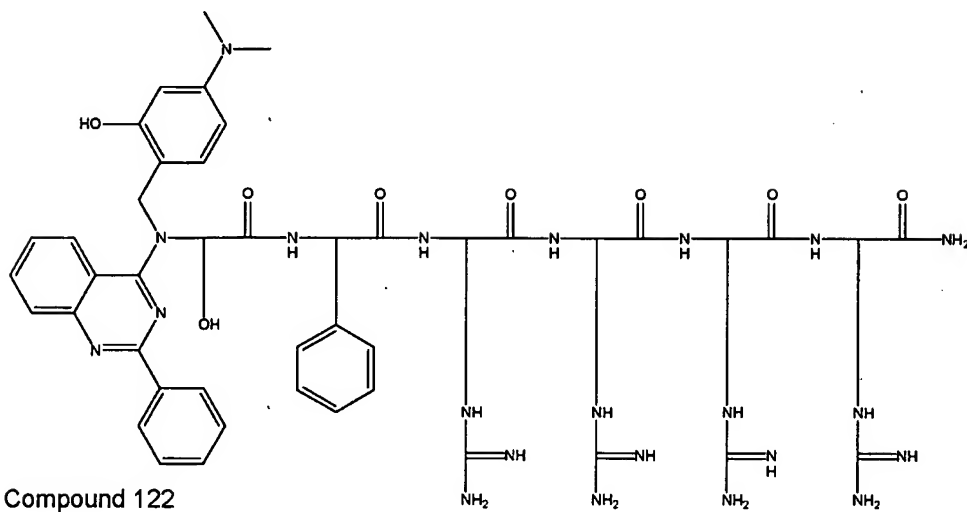
Compound 121

Applicant: David S. Lawrence

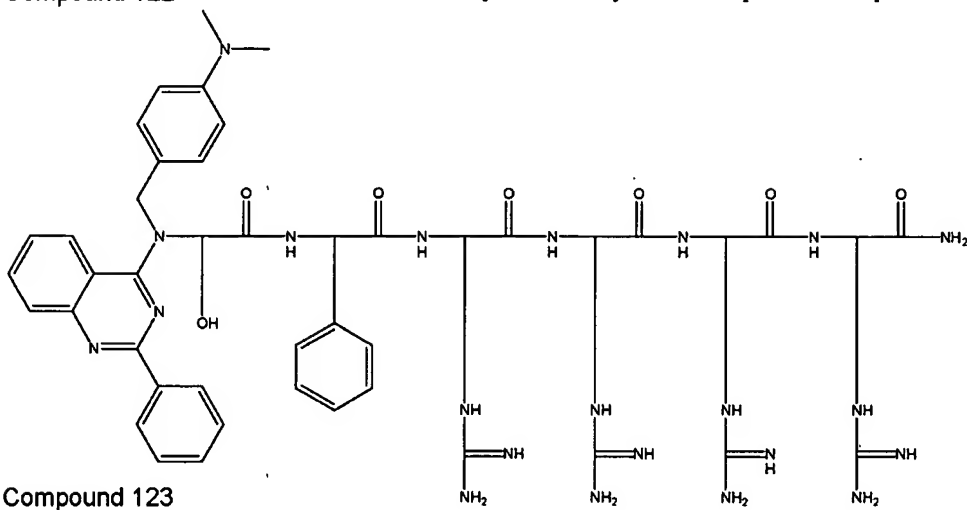
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Compound 122



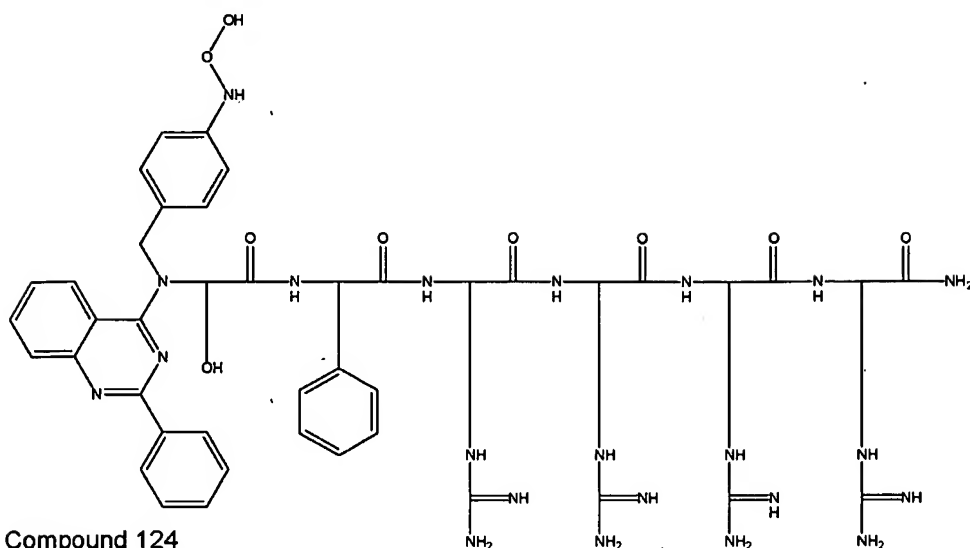
Compound 123

Applicant: David S. Lawrence

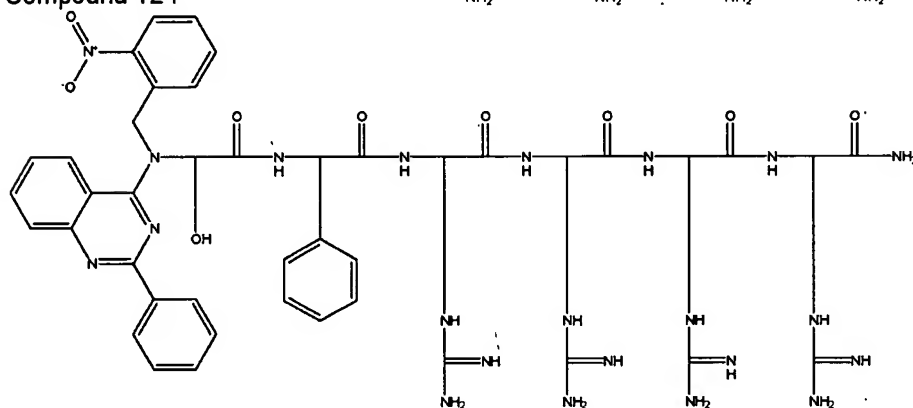
Serial No.: 10/755,086

Filed: January 9, 2004

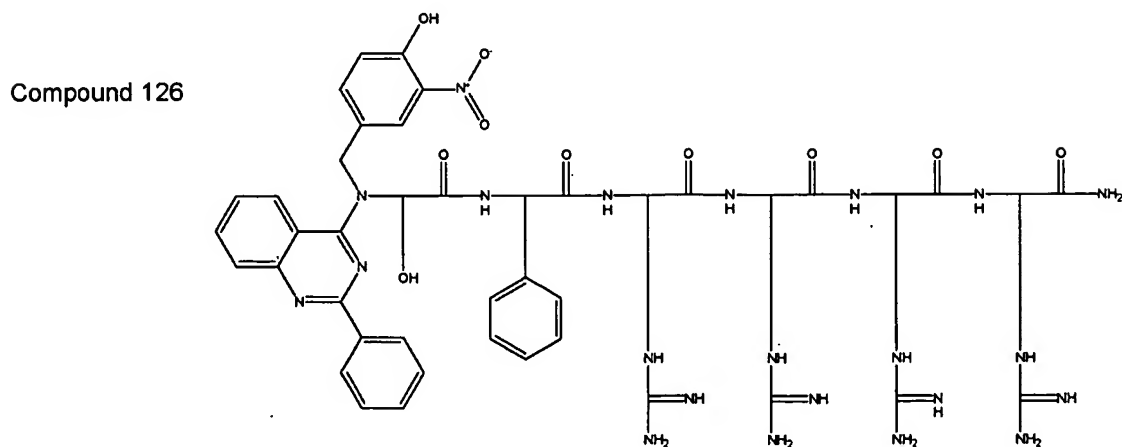
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Compound 124



Compound 125



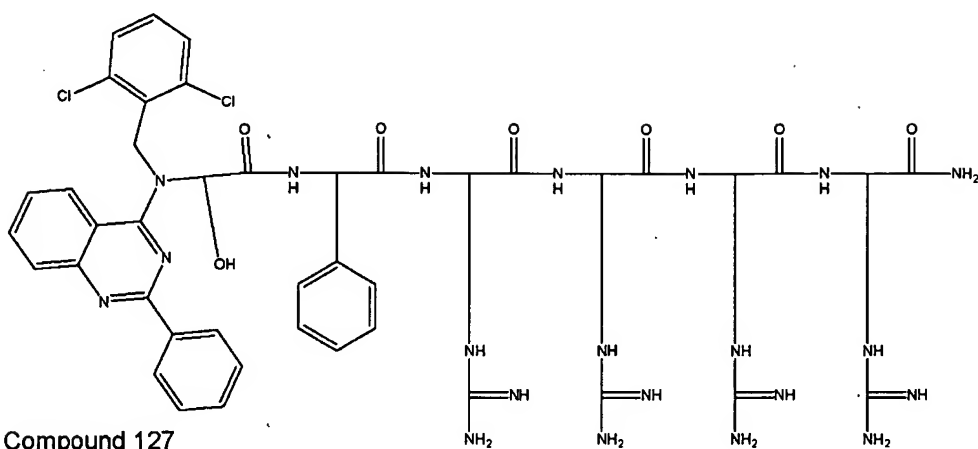
Compound 126

Applicant: David S. Lawrence

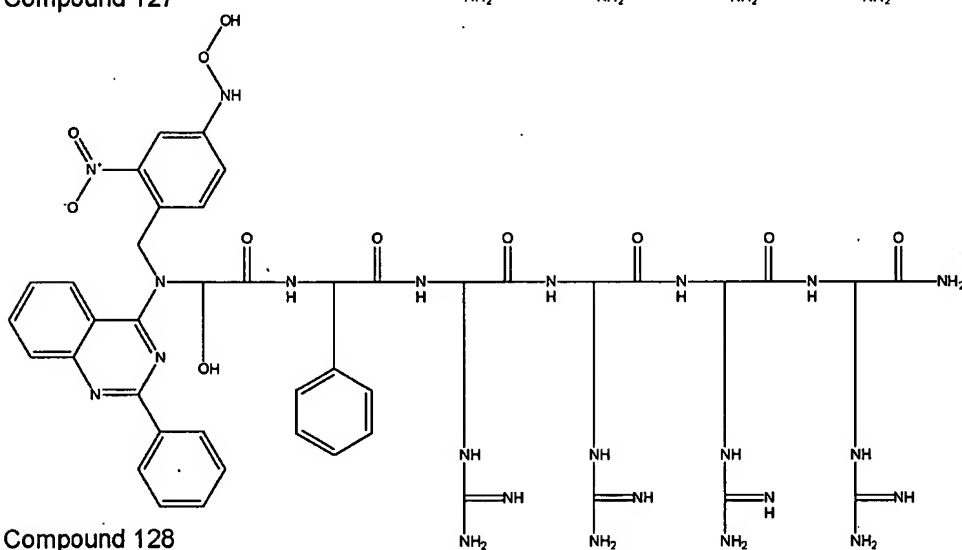
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Compound 127



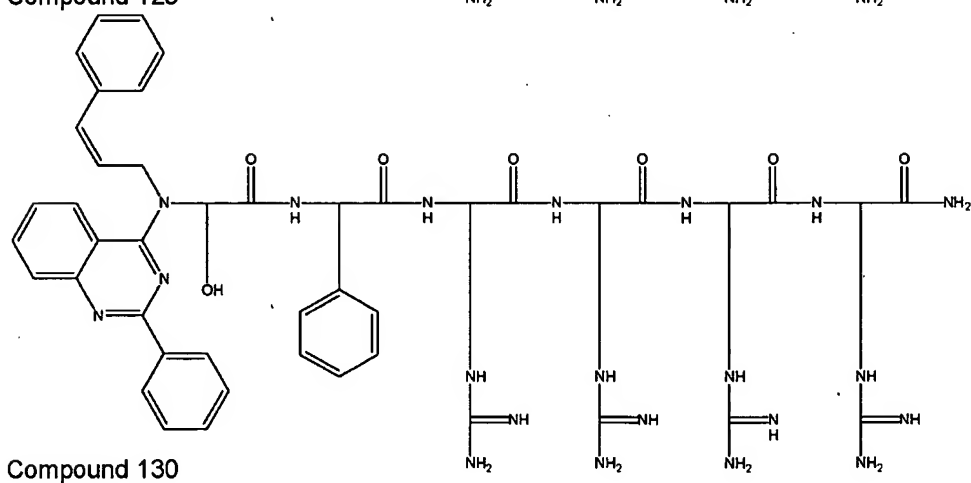
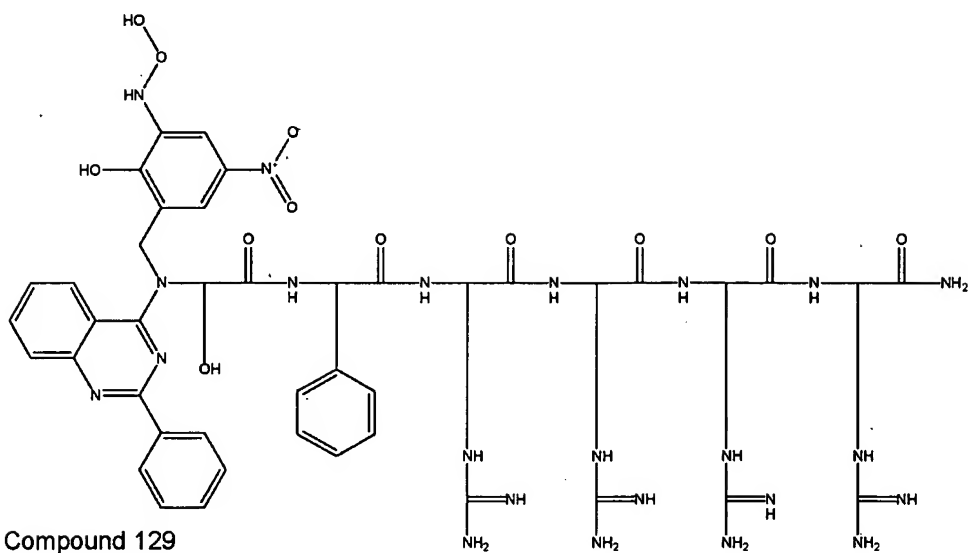
Compound 128

Applicant: David S. Lawrence

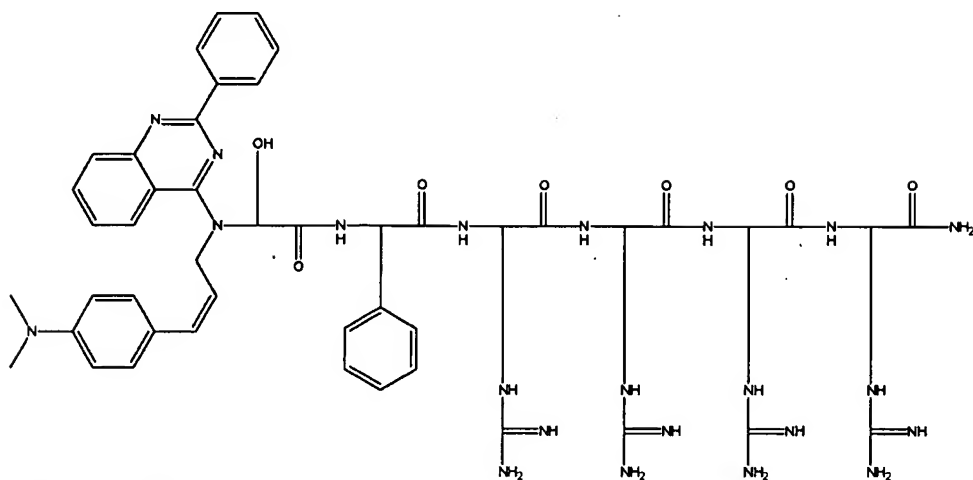
Serial No.: 10/755,086

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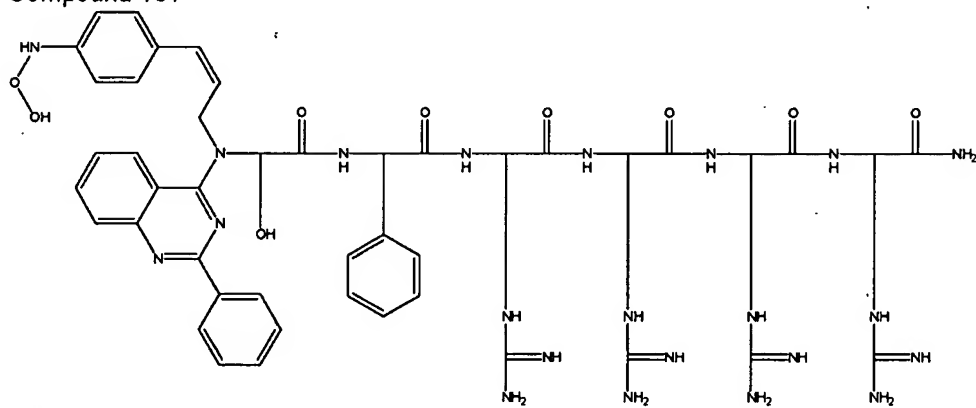
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Compound 131



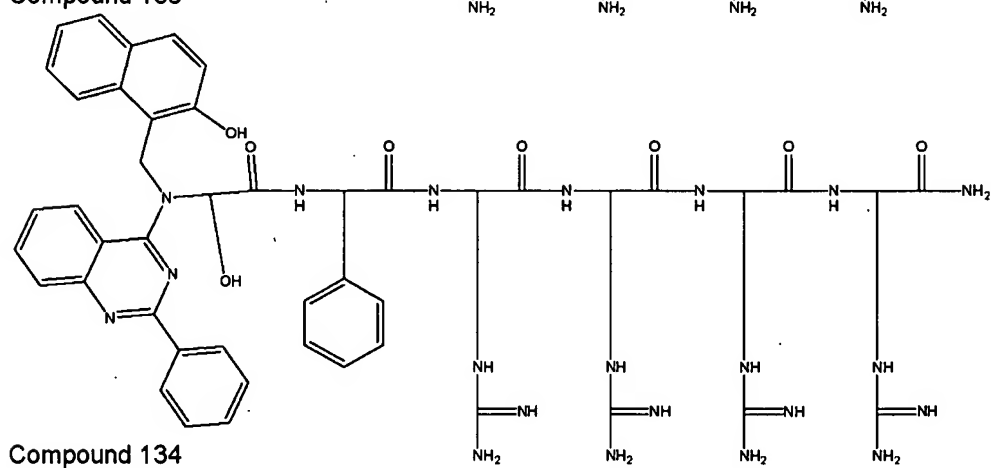
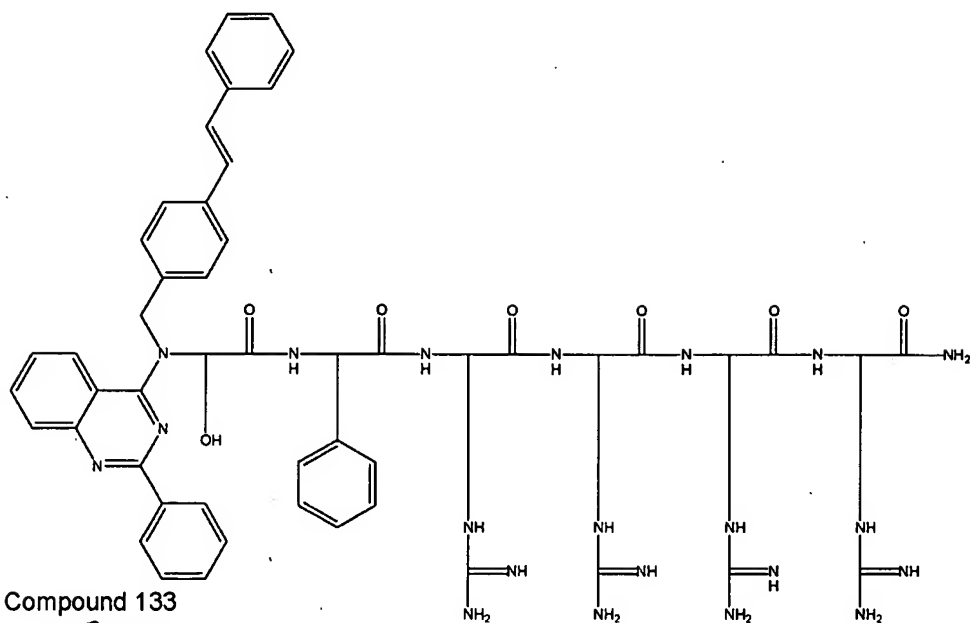
Compound 132

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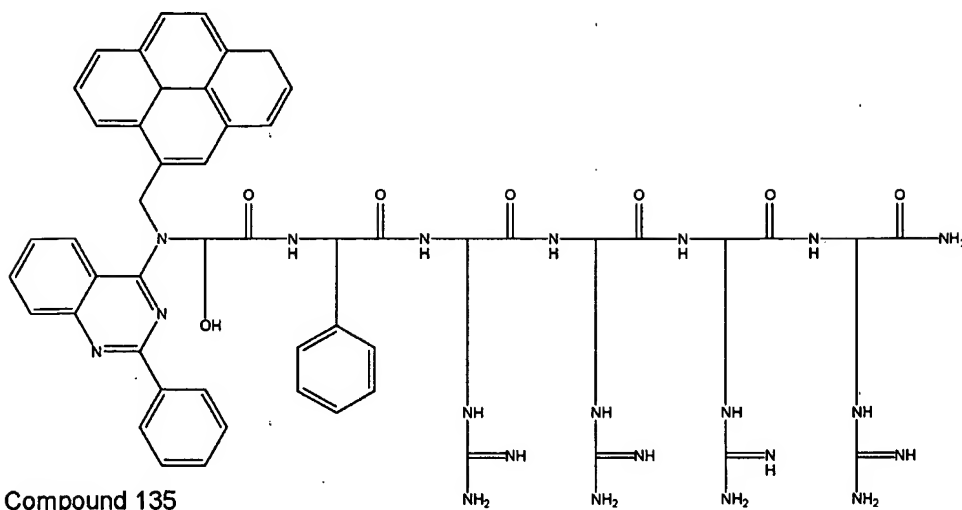


Applicant: David S. Lawrence

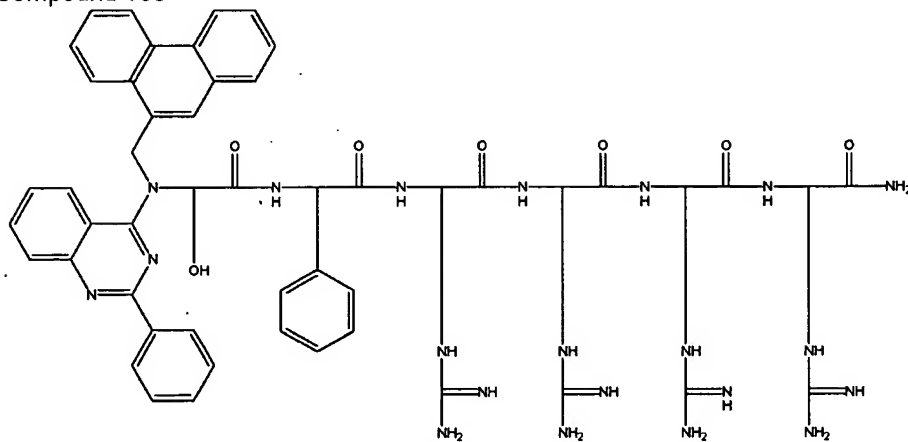
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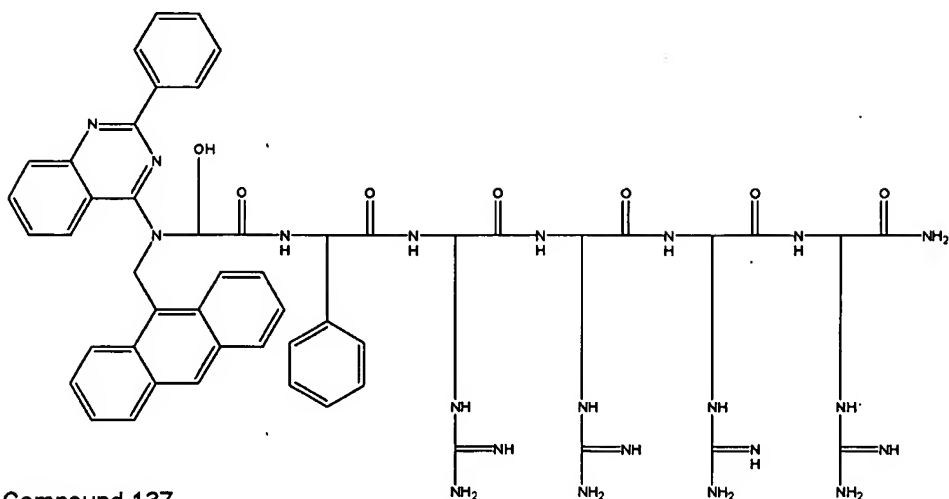


Compound 135

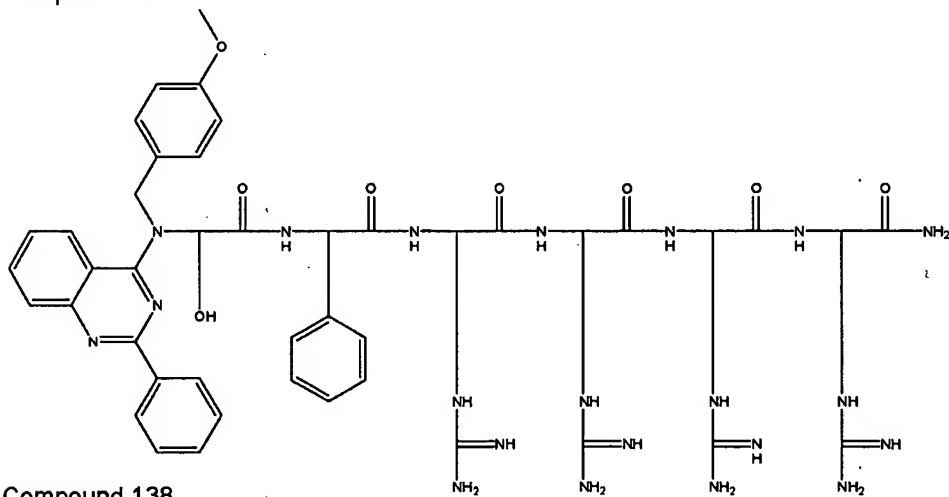


Compound 136

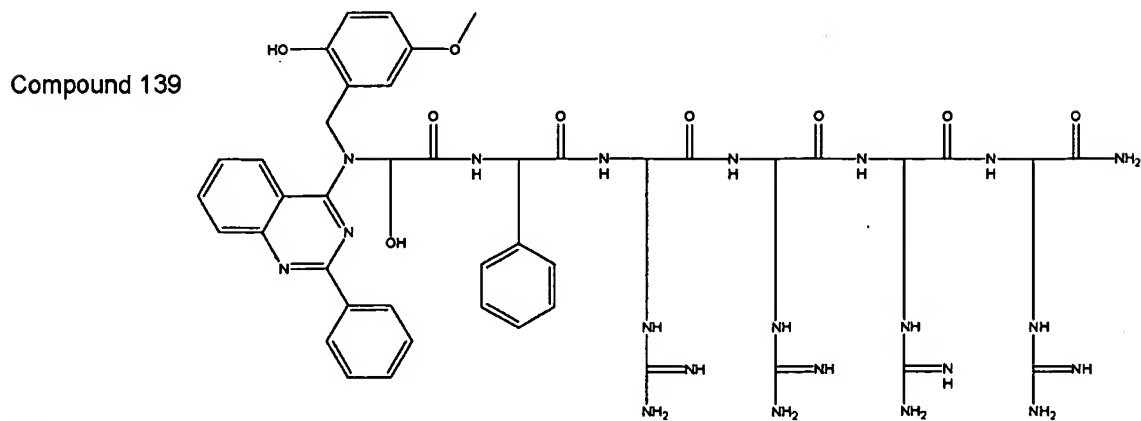
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Compound 137



Compound 138

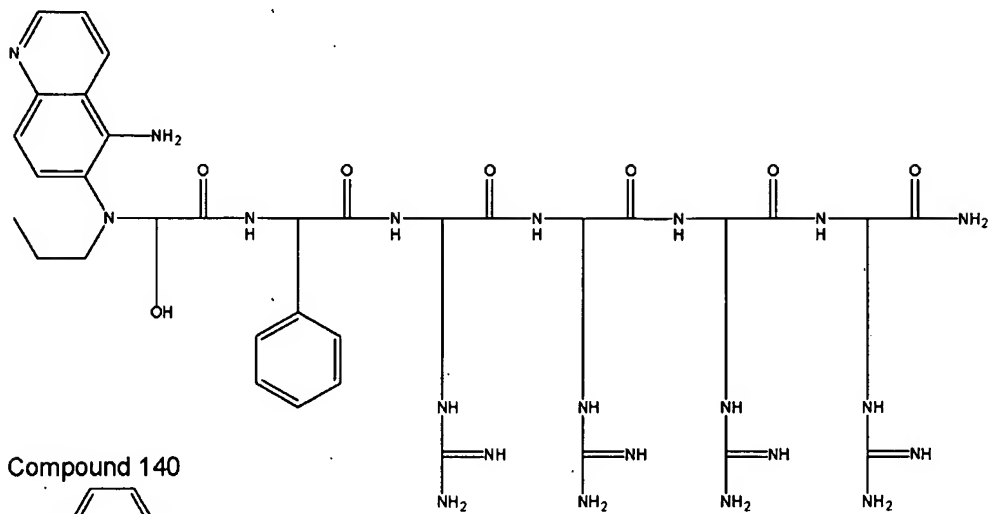


Applicant: David S. Lawrence

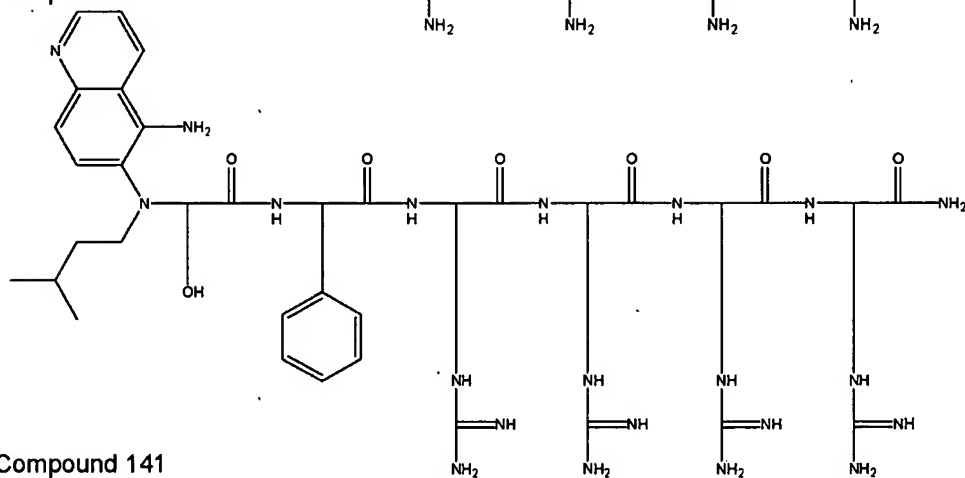
Serial No.: 10/755,086

Filed: January 9, 2004

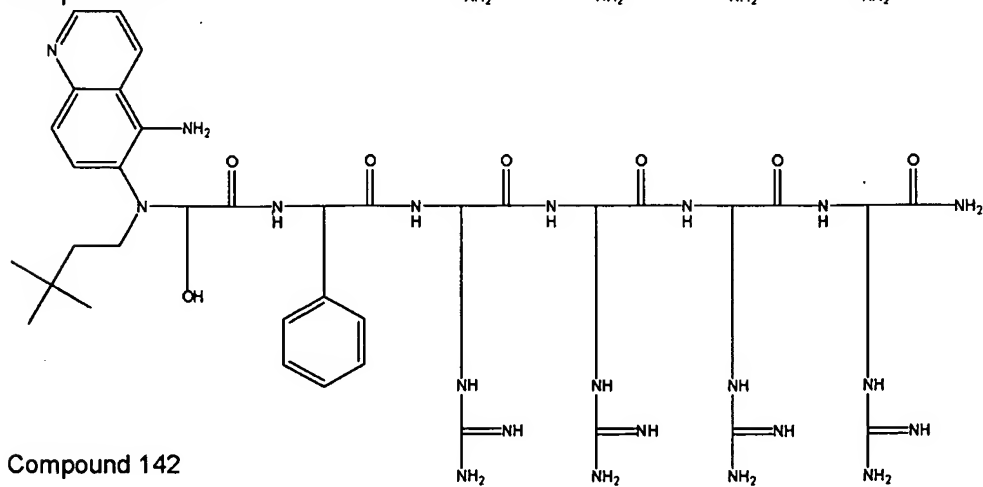
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Compound 140

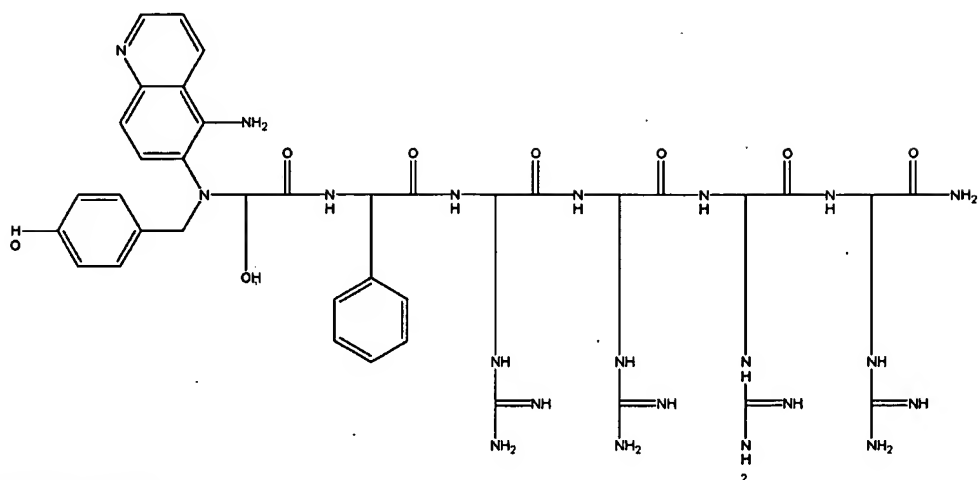


Compound 141

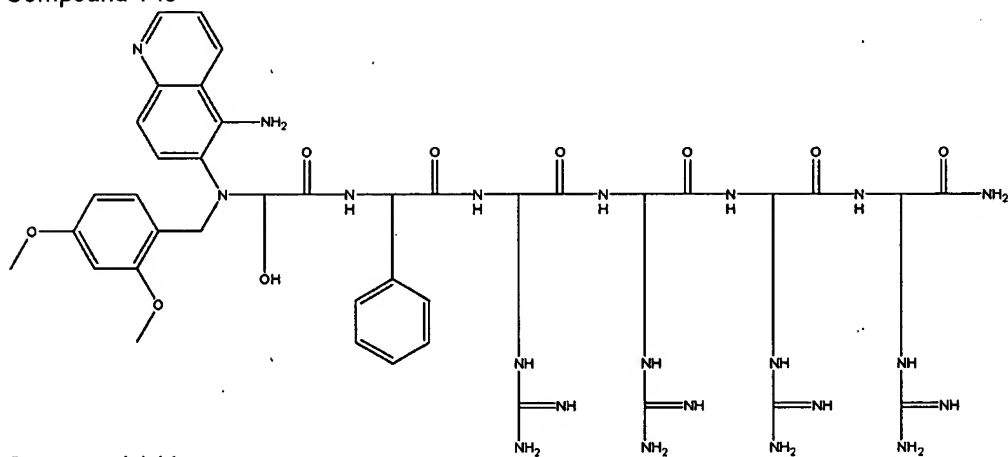


Compound 142

Applicant: David S. Lawrence
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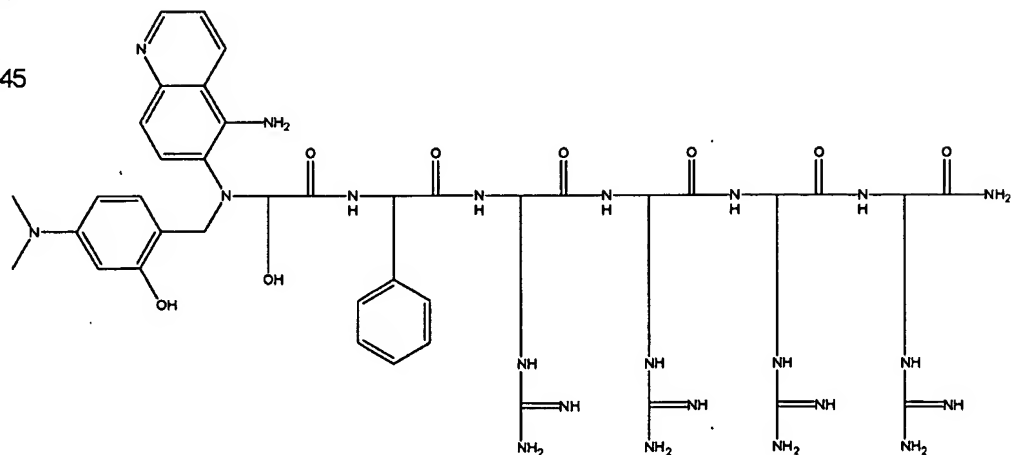


Compound 143



Compound 144

Compound 145

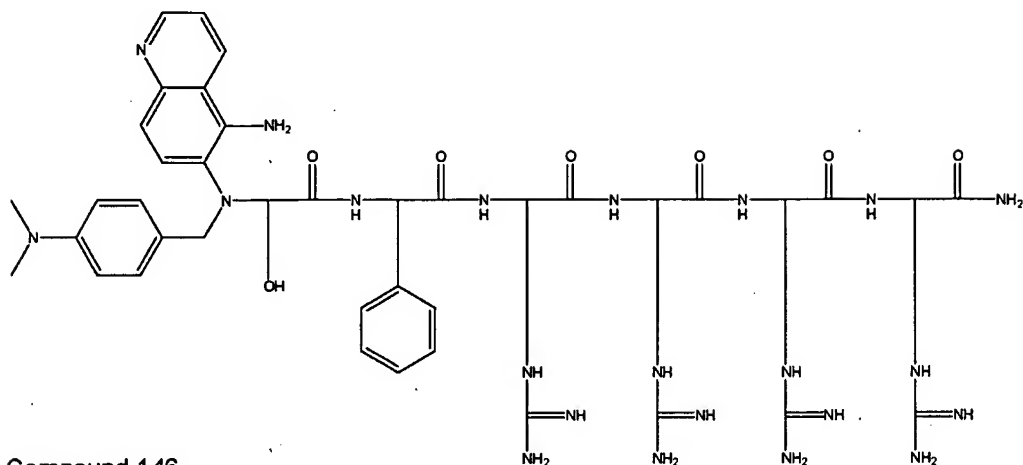


Applicant: David S. Lawrence

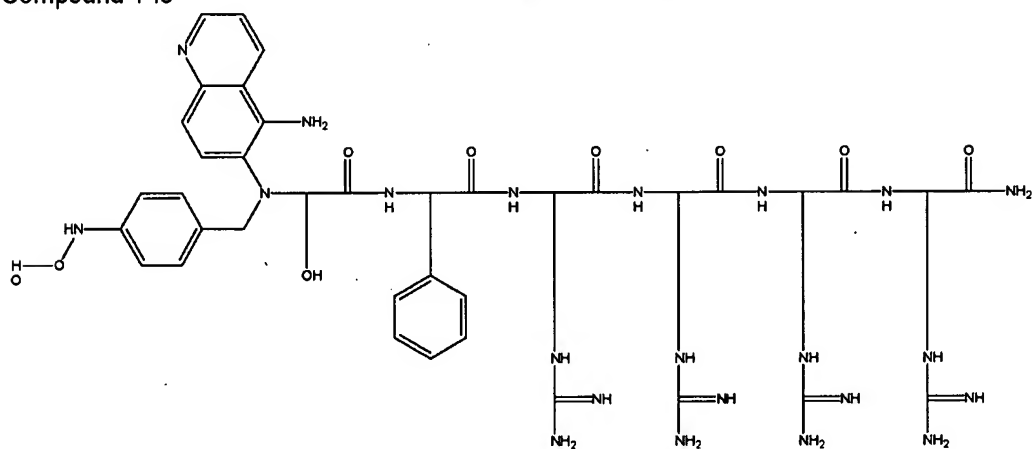
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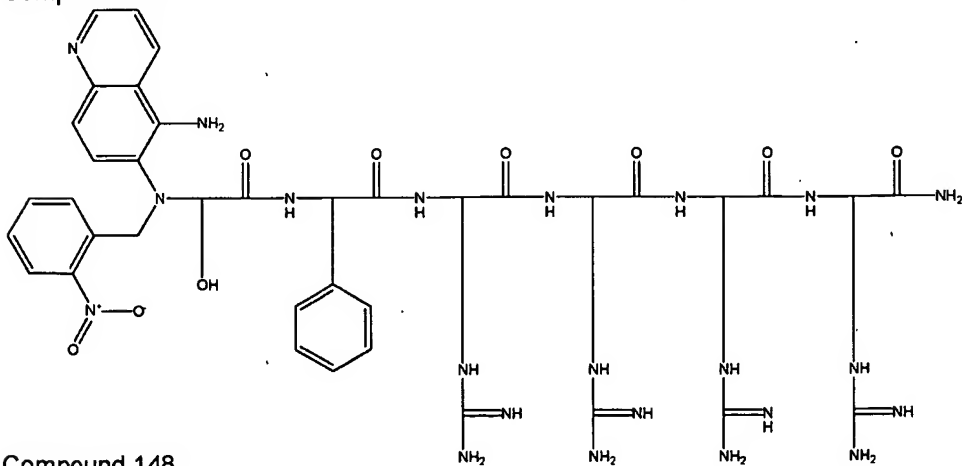
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Compound 146



Compound 147



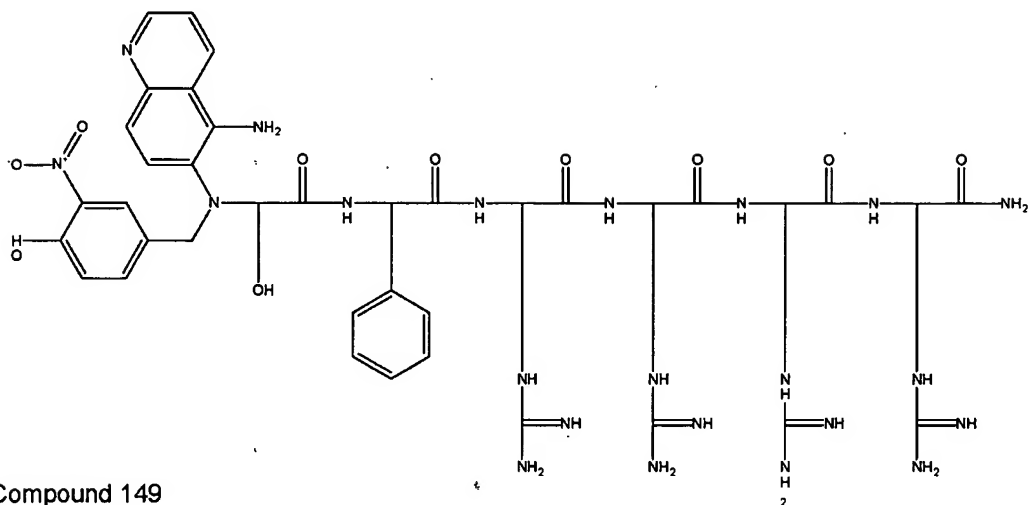
Compound 148

Applicant: David S. Lawrence

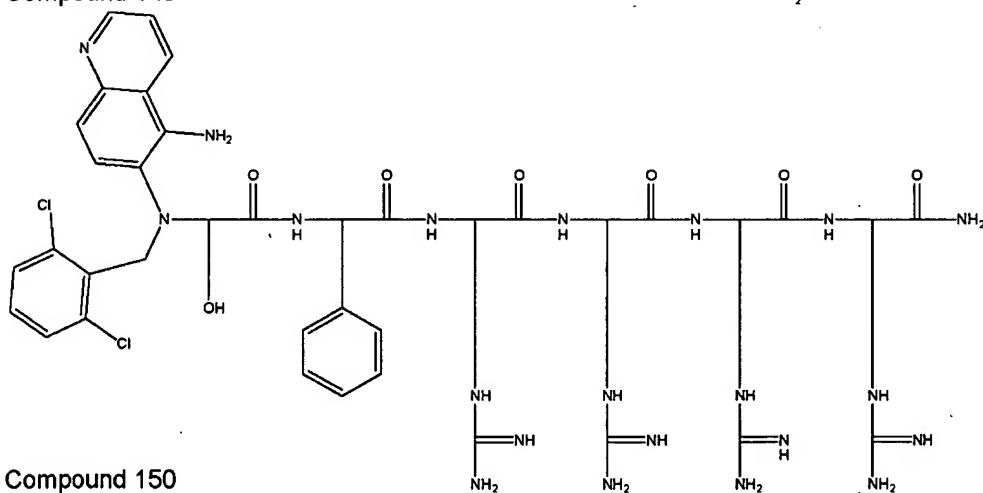
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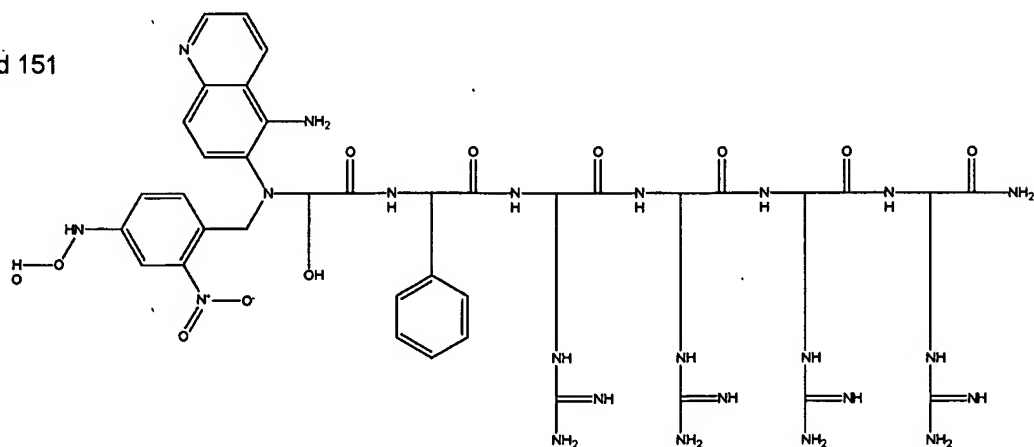


Compound 149



Compound 150

Compound 151

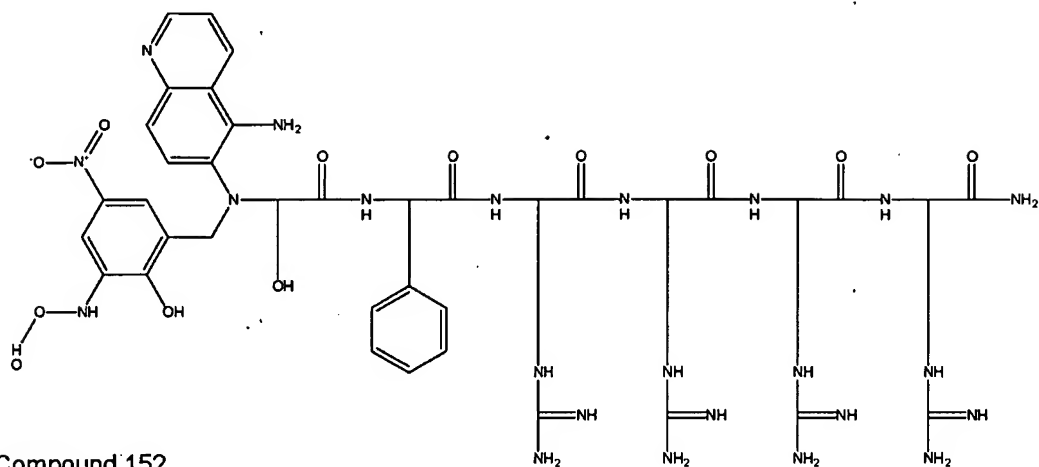


Applicant: David S. Lawrence

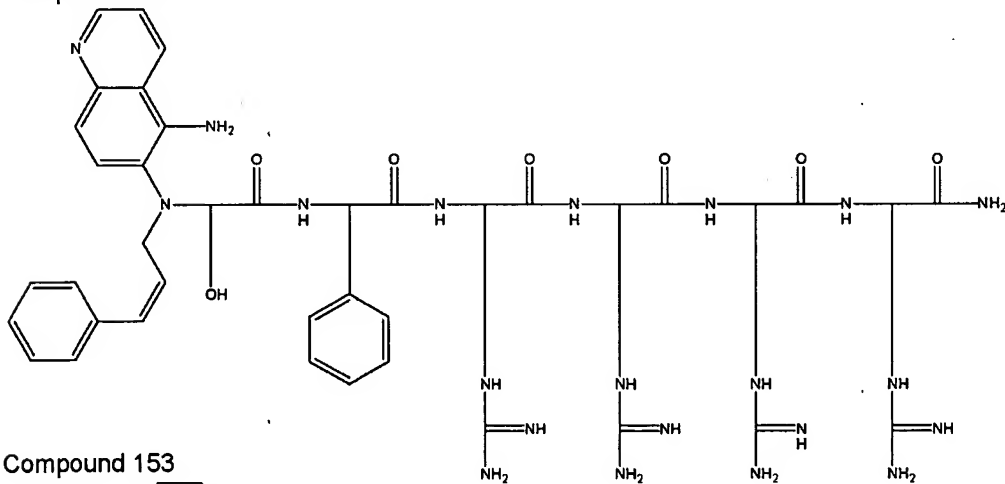
Serial No.: 10/755,086

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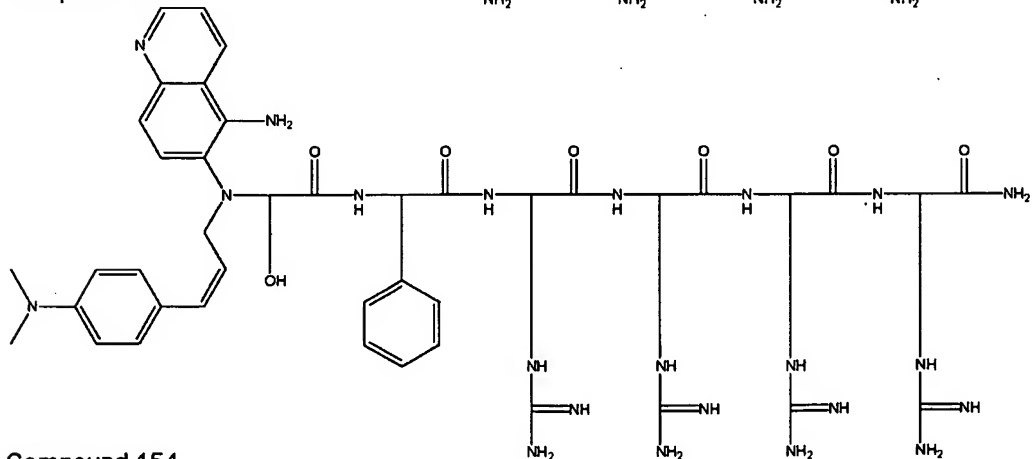
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Compound 152



Compound 153



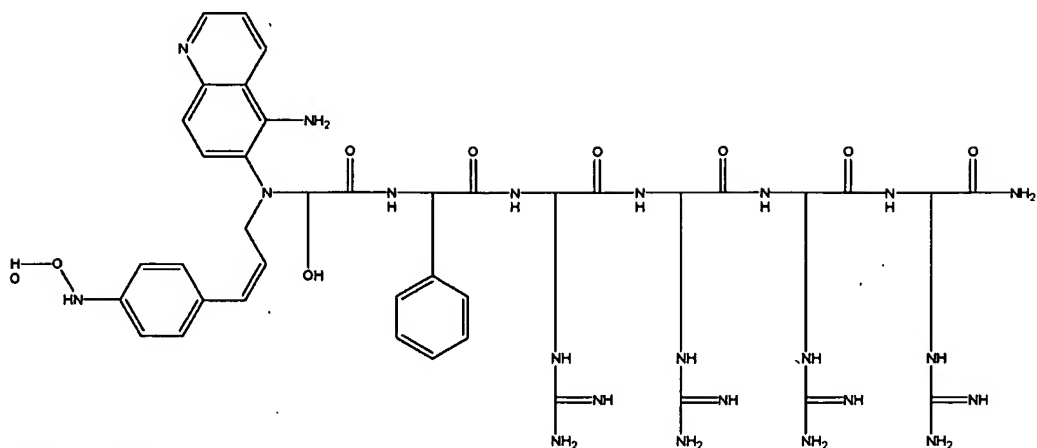
Compound 154

Applicant: David S. Lawrence

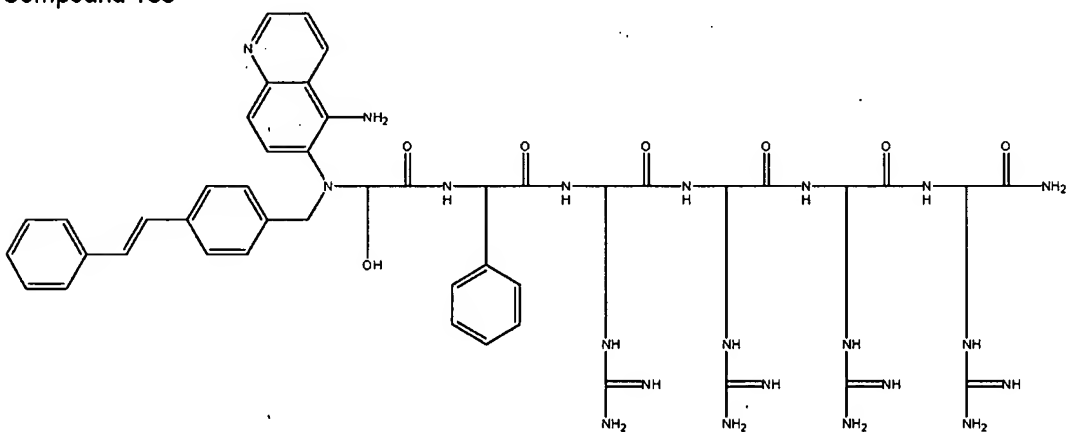
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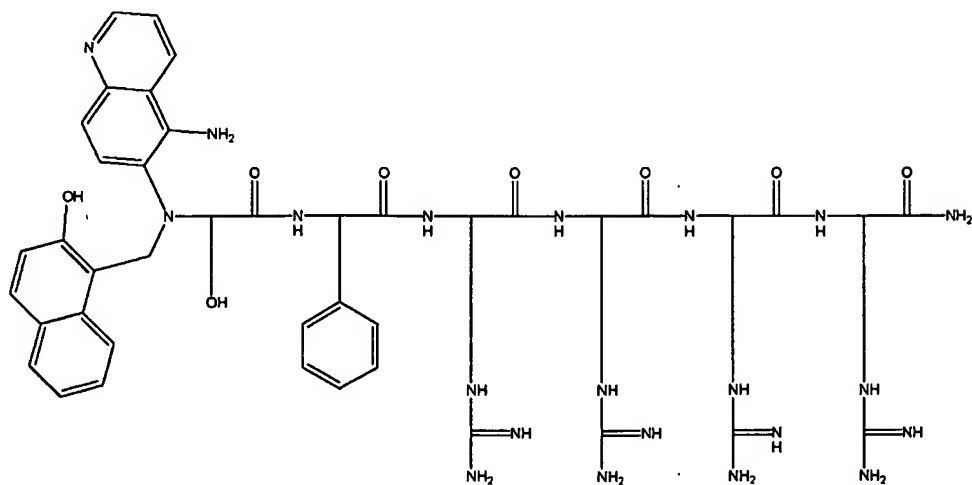


Compound 155

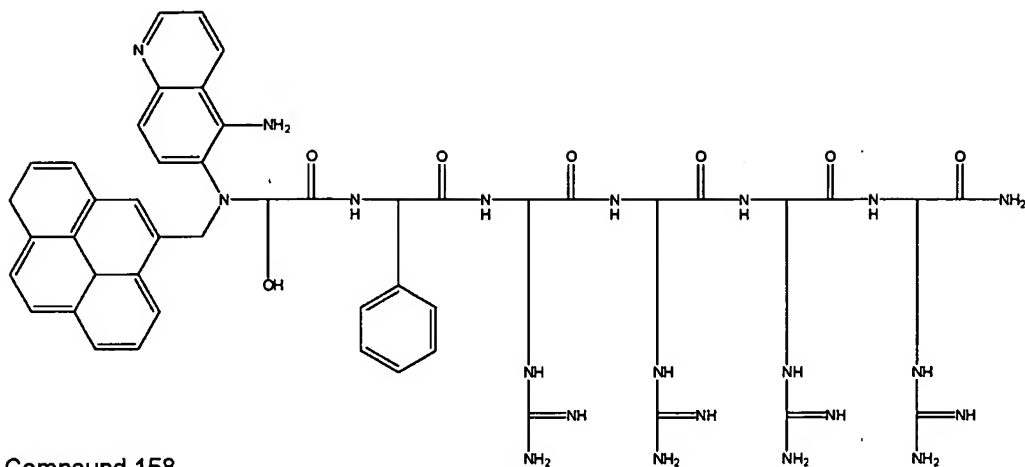


Compound 156

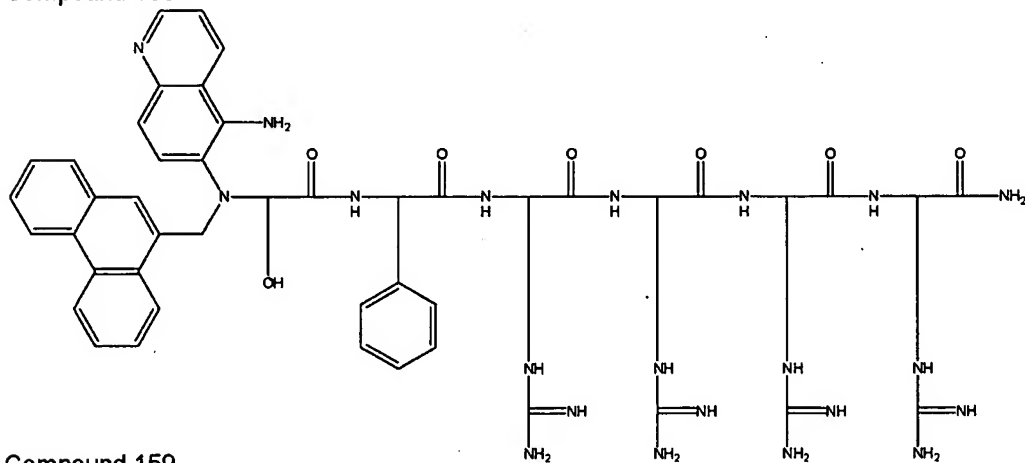
Compound 157



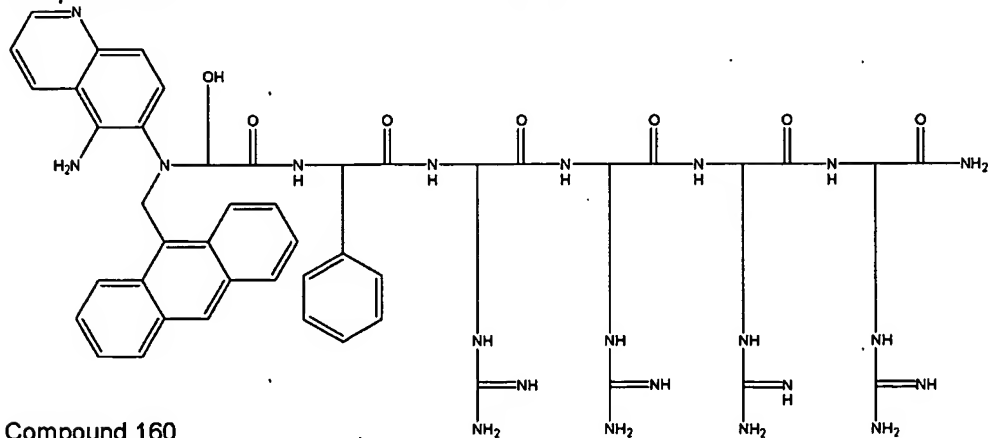
Applicant: David S. Lawrence
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Compound 158



Compound 159



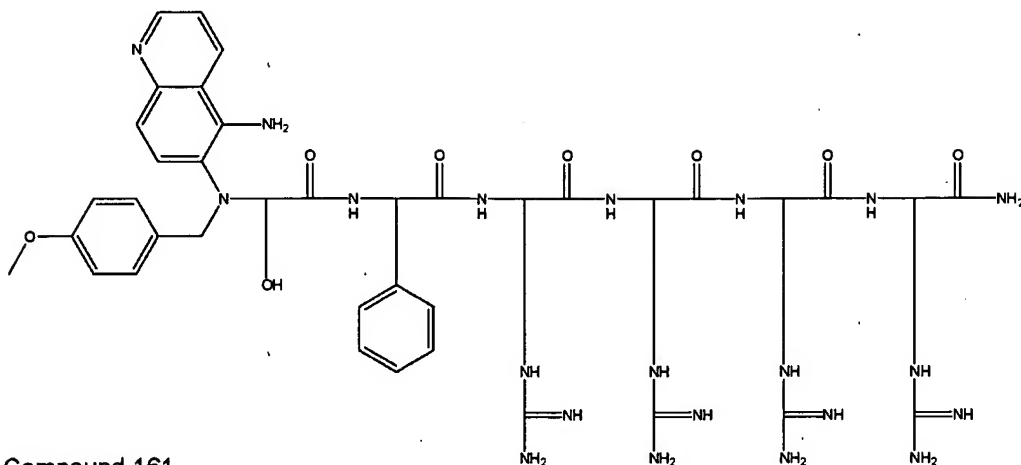
Compound 160

Applicant: David S. Lawrence

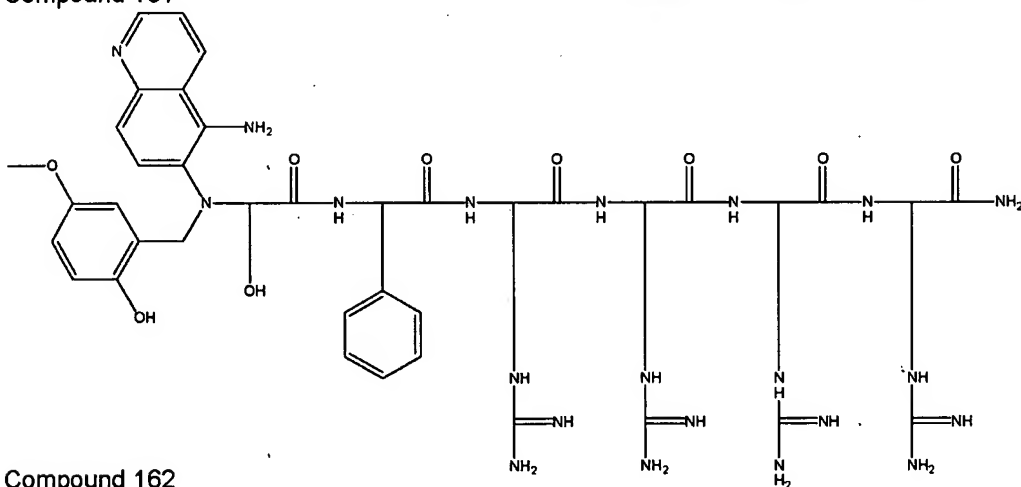
Serial No.: 10/755,086

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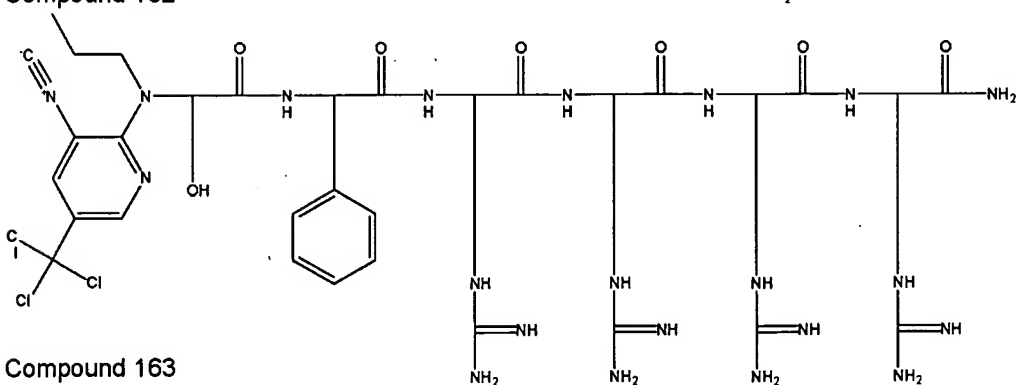
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Compound 161



Compound 162



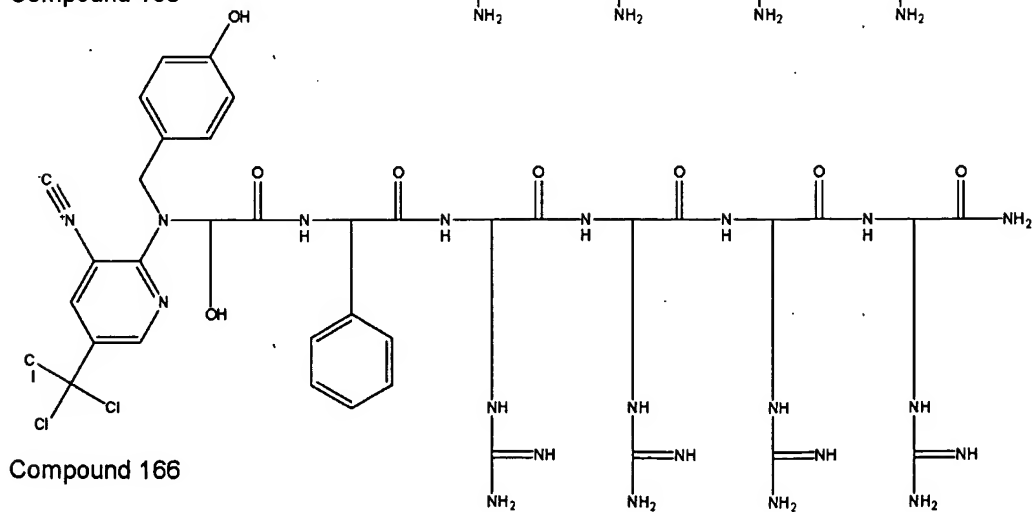
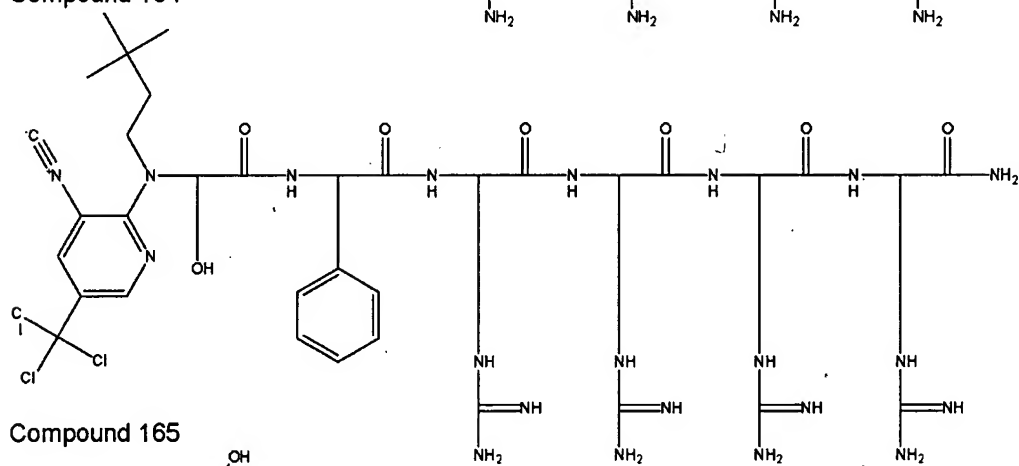
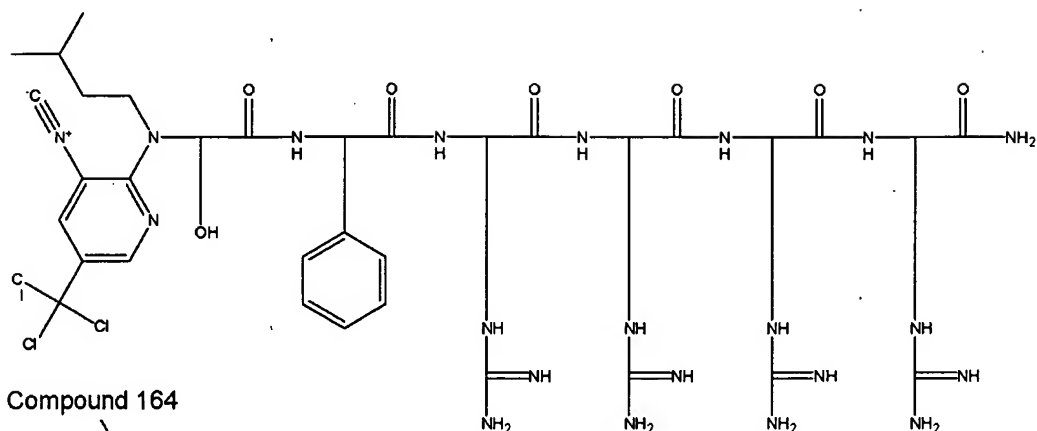
Compound 163

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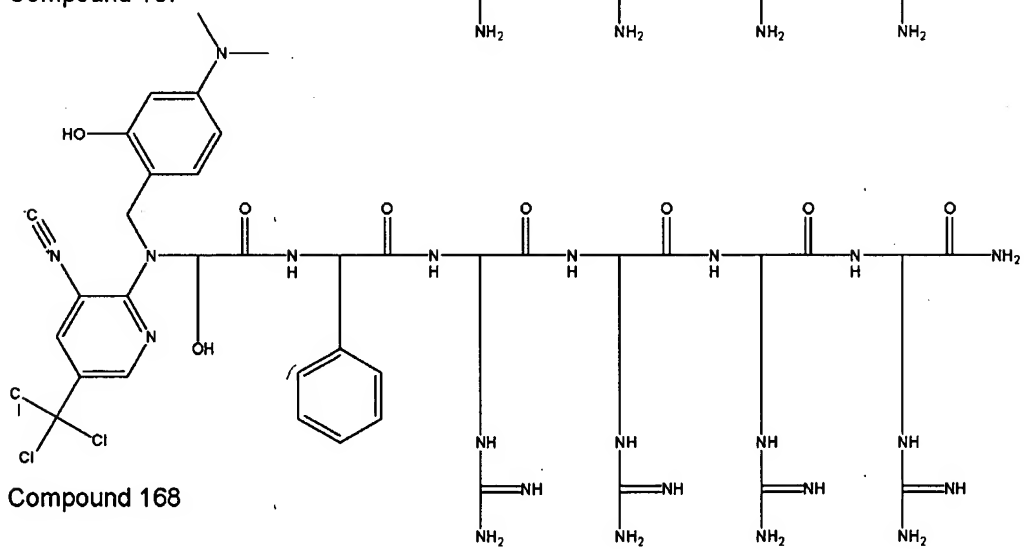
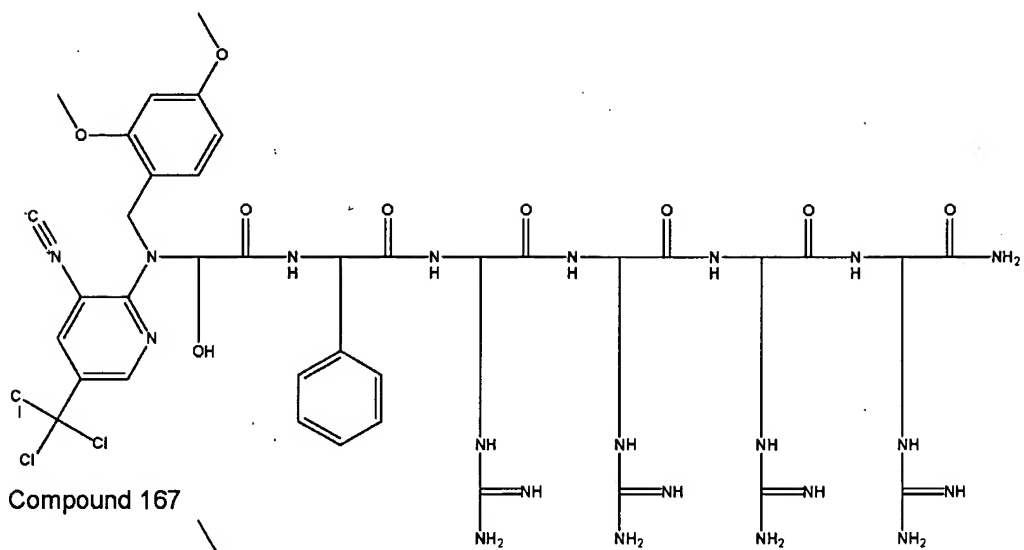


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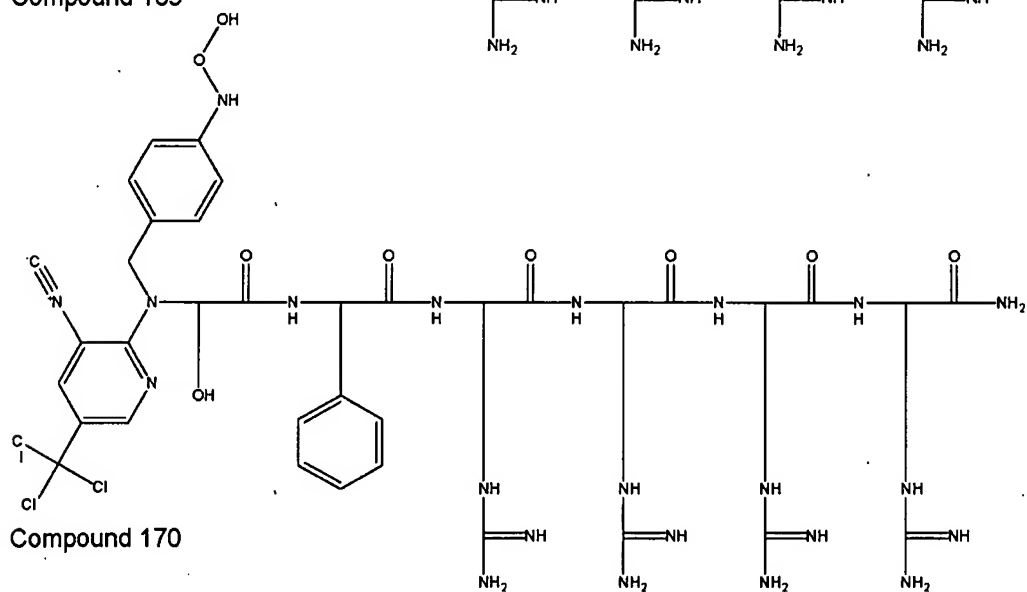
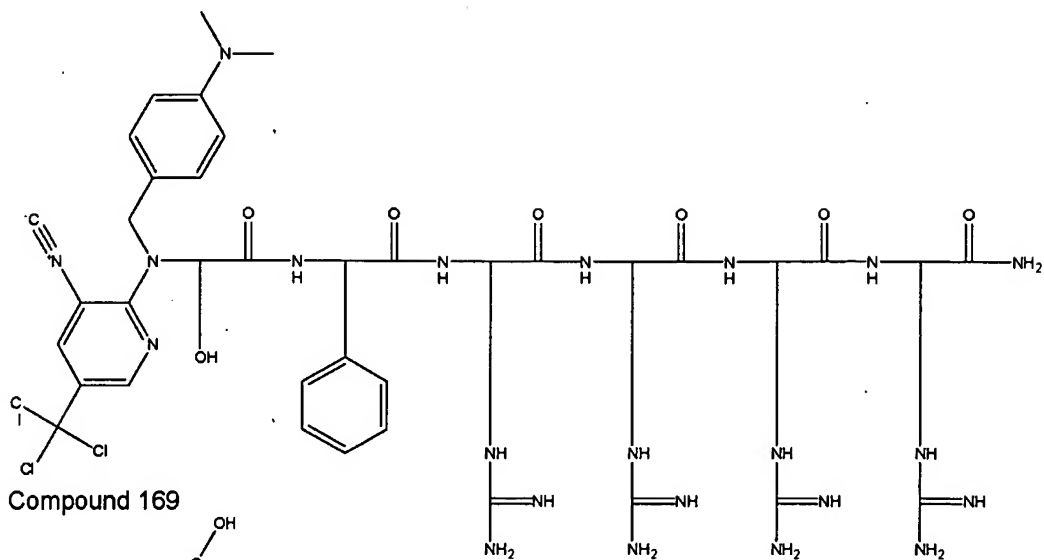


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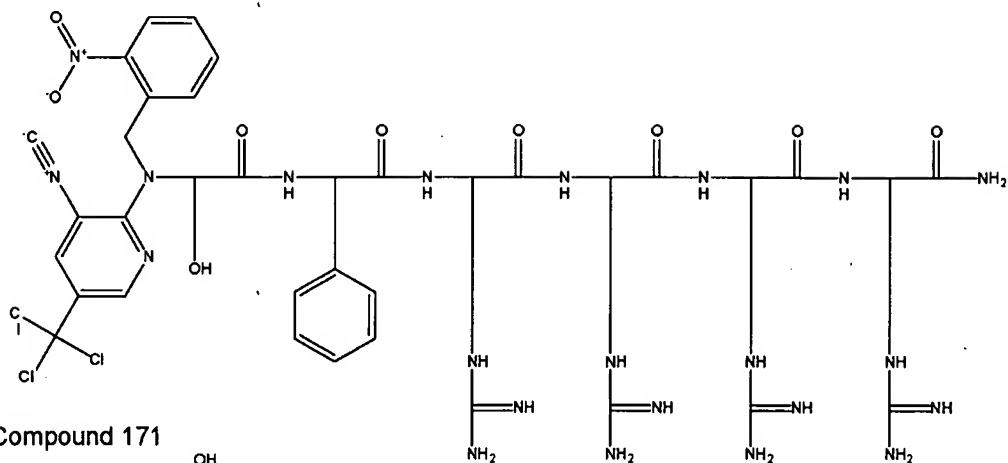


Applicant: David S. Lawrence

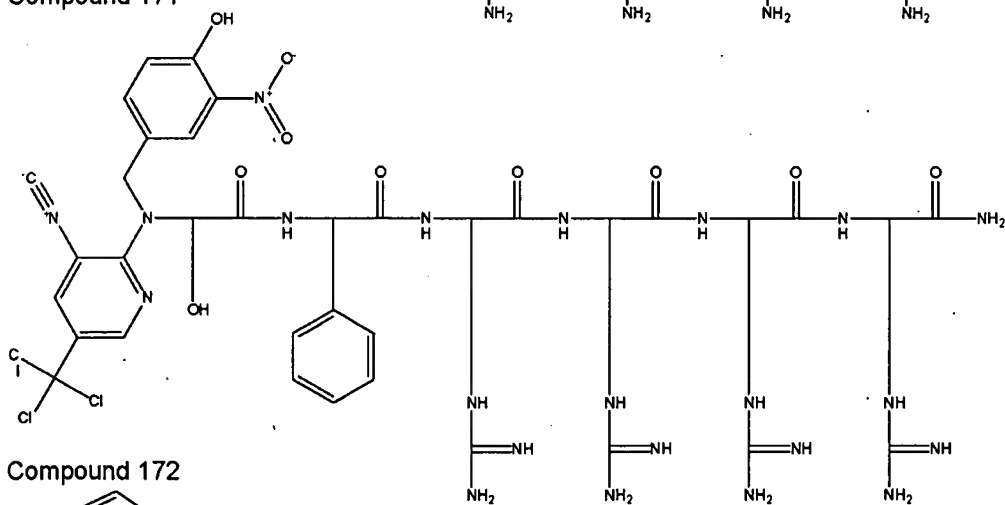
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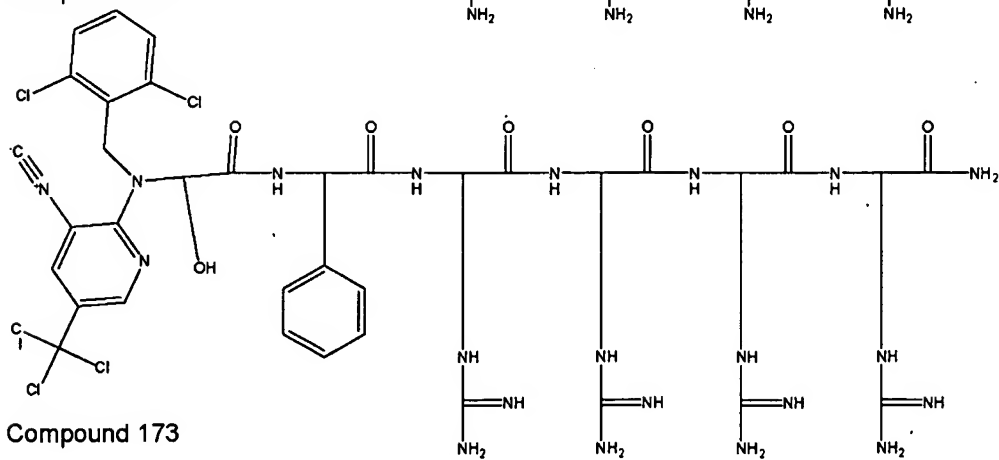
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Compound 171



Compound 172



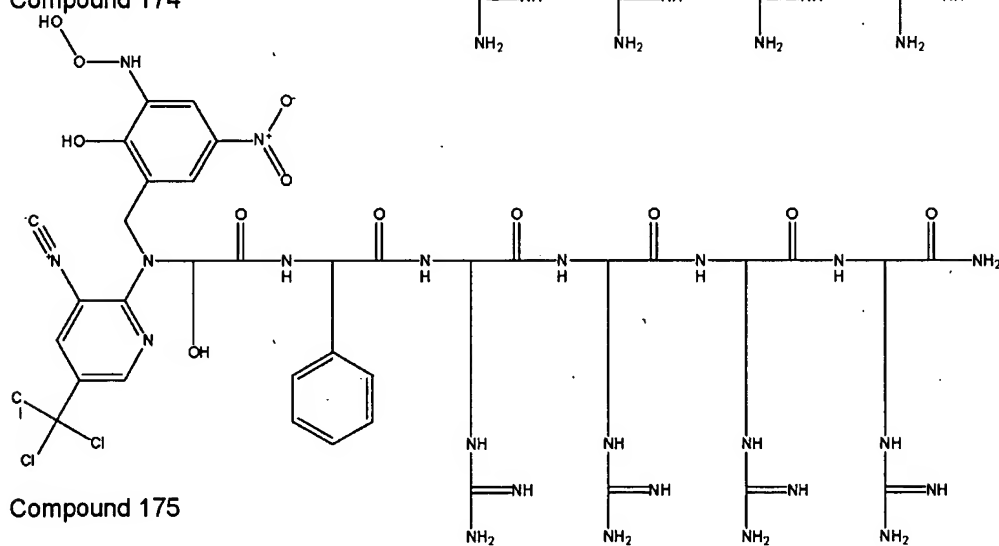
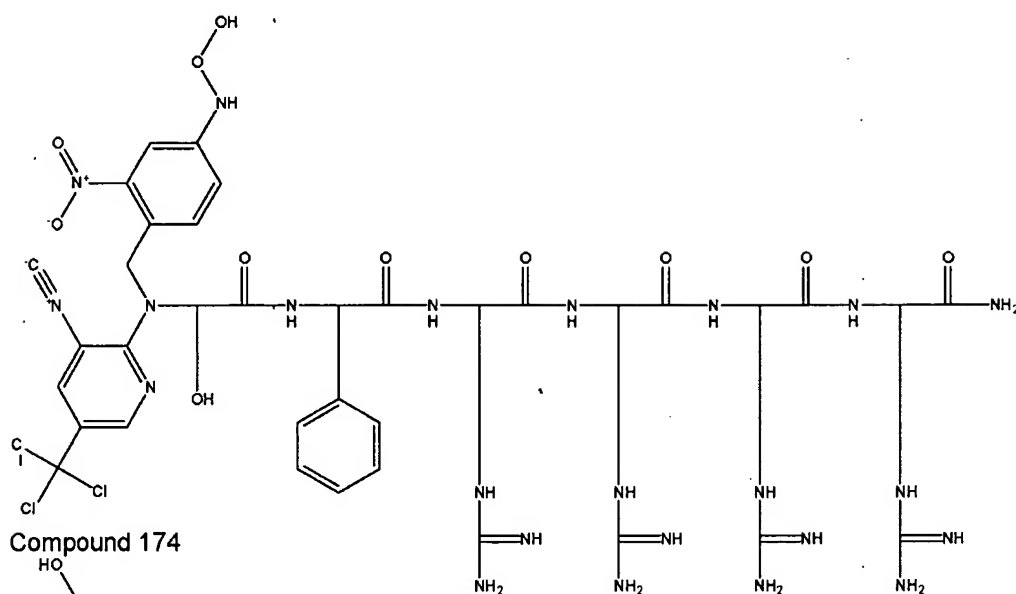
Compound 173

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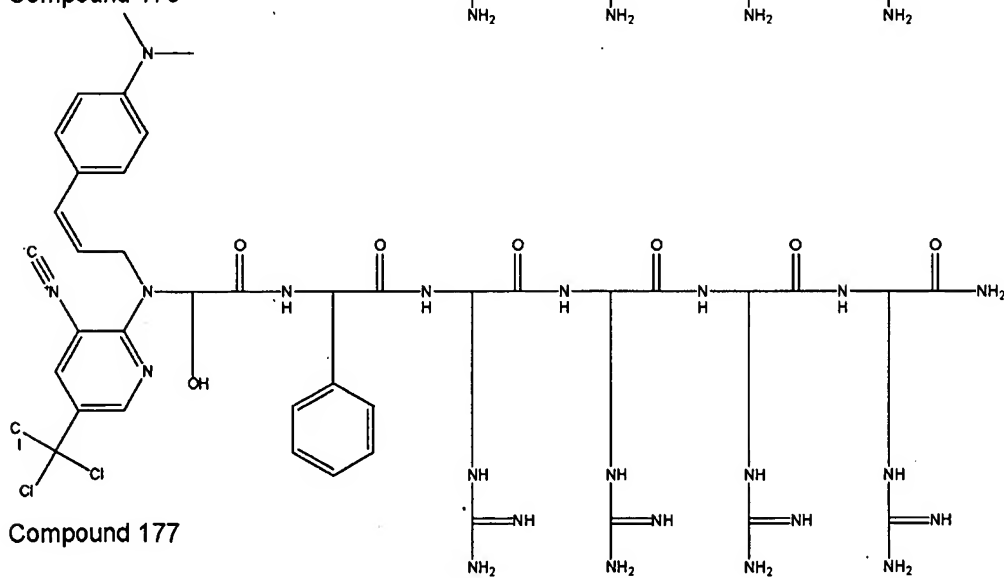
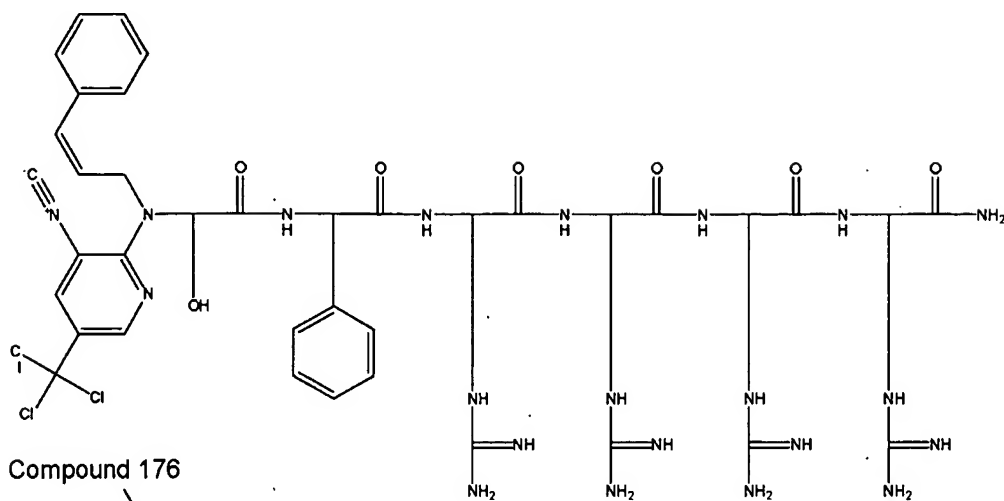


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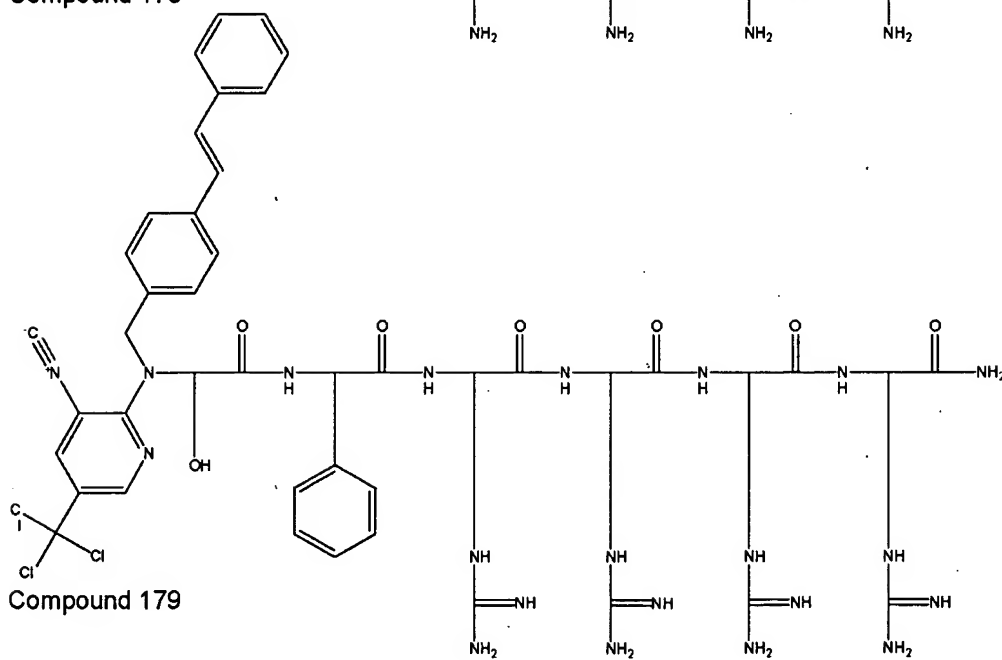
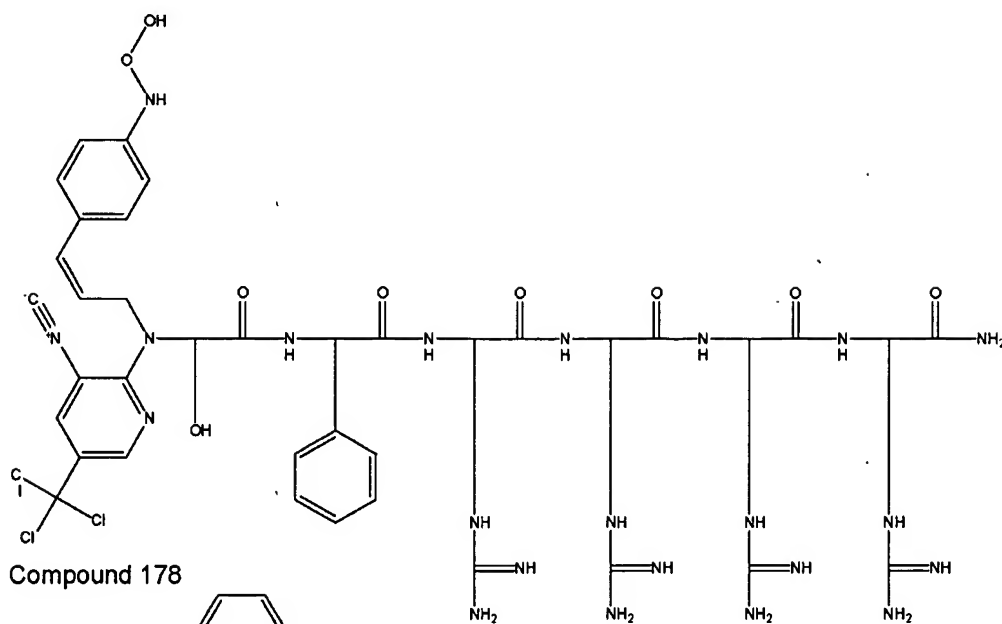


Applicant: David S. Lawrence

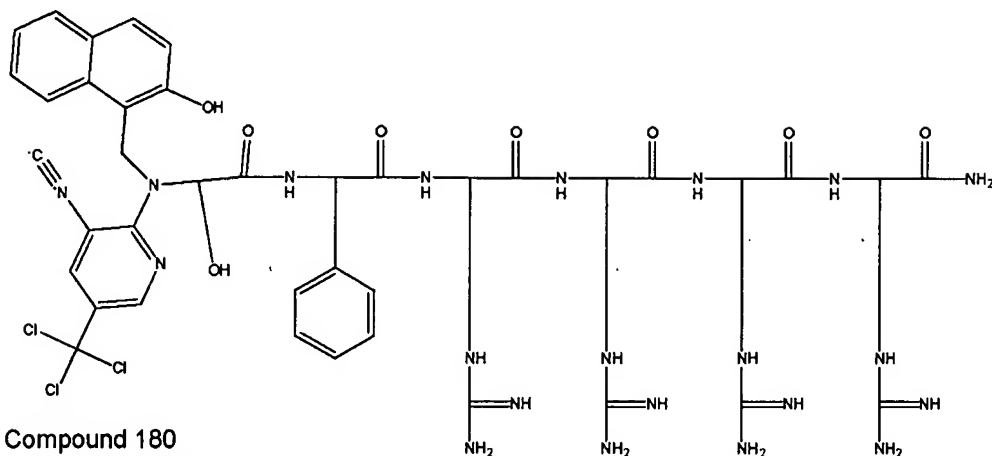
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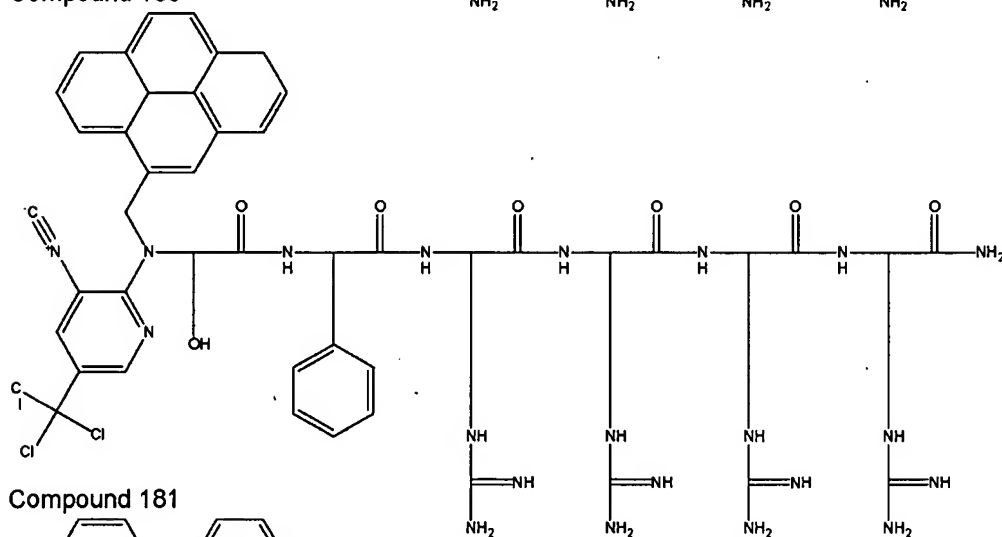
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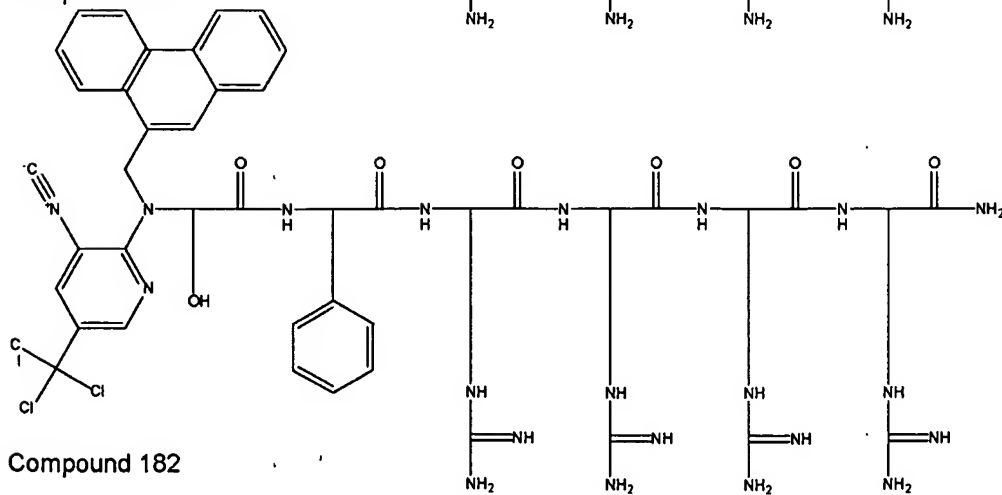
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Compound 180



Compound 181



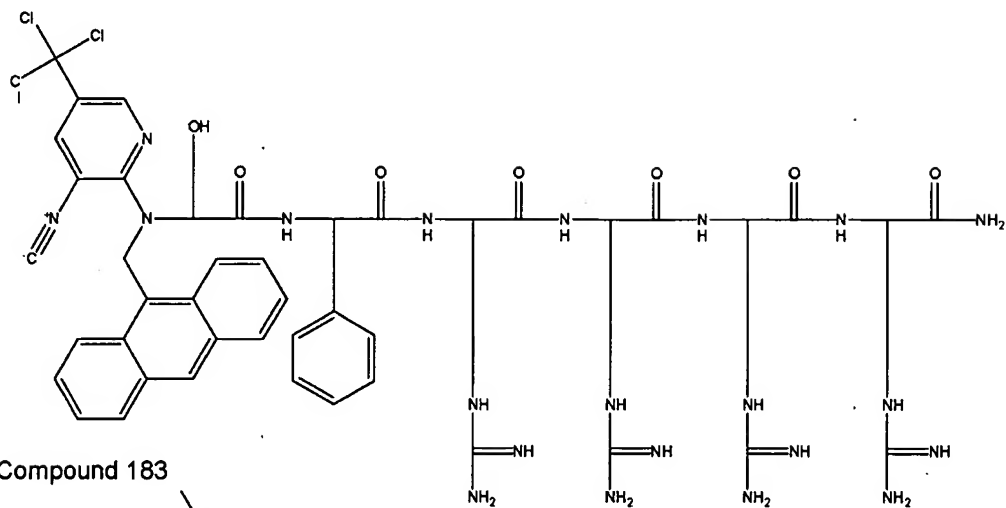
Compound 182

Applicant: David S. Lawrence

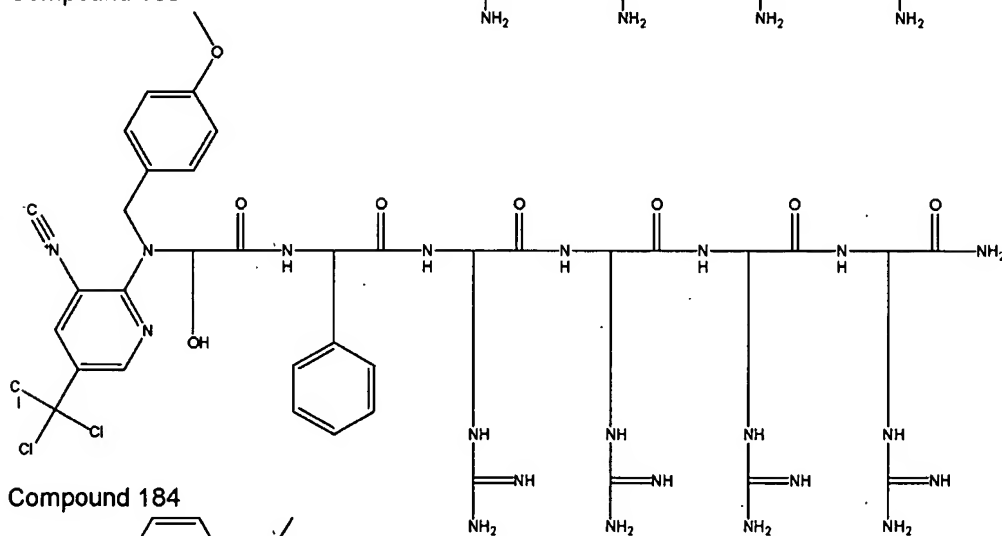
Serial No.: 10/755,086

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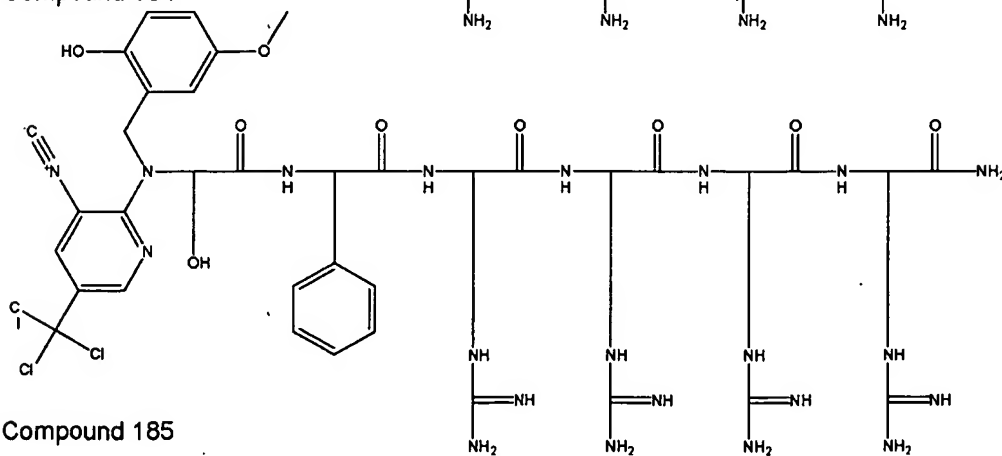
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Compound 183



Compound 184



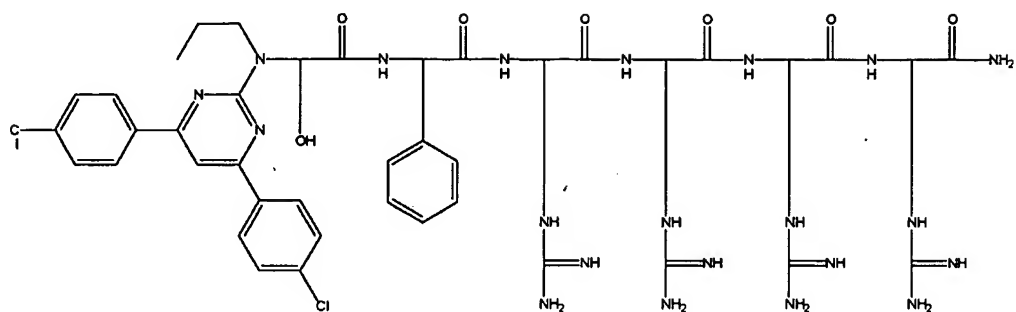
Compound 185

Applicant: David S. Lawrence

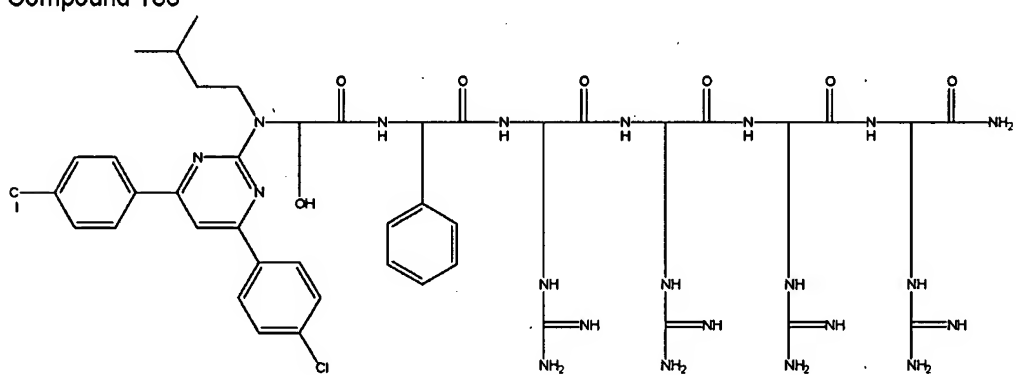
Serial No.: 10/755,086

Filed: January 9, 2004

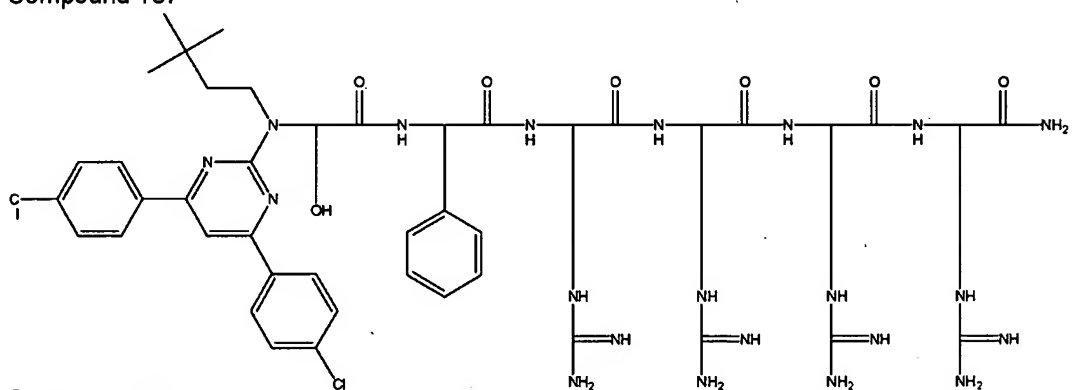
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Compound 186



Compound 187



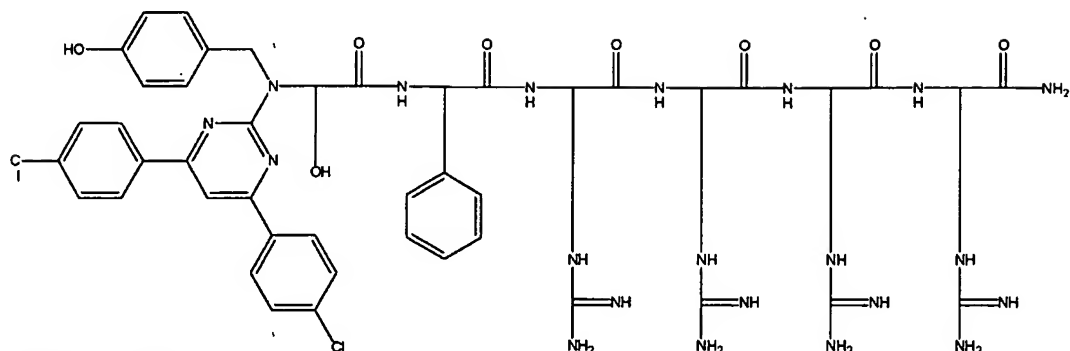
Compound 188

Applicant: David S. Lawrence

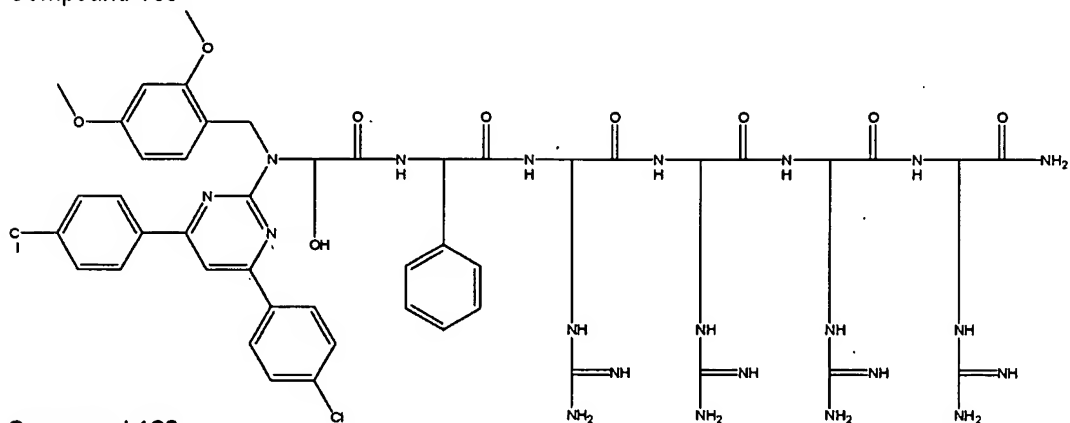
Serial No.: 10/755,086

Filed: January 9, 2004

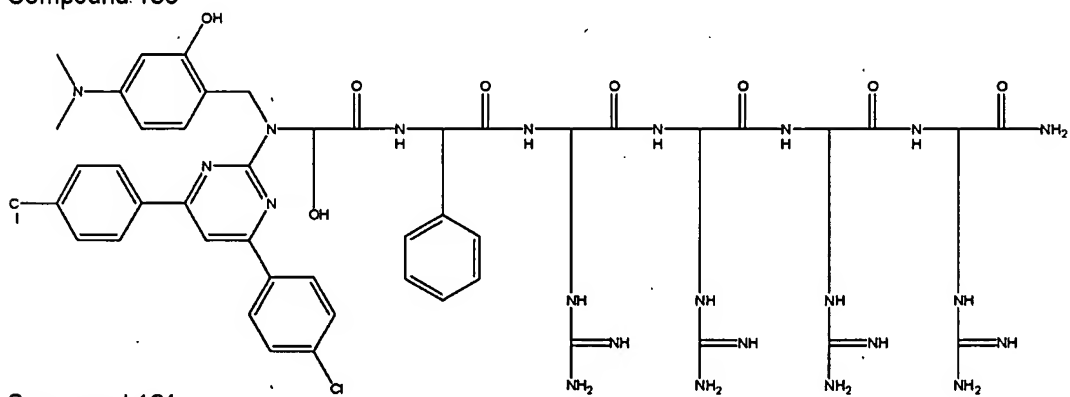
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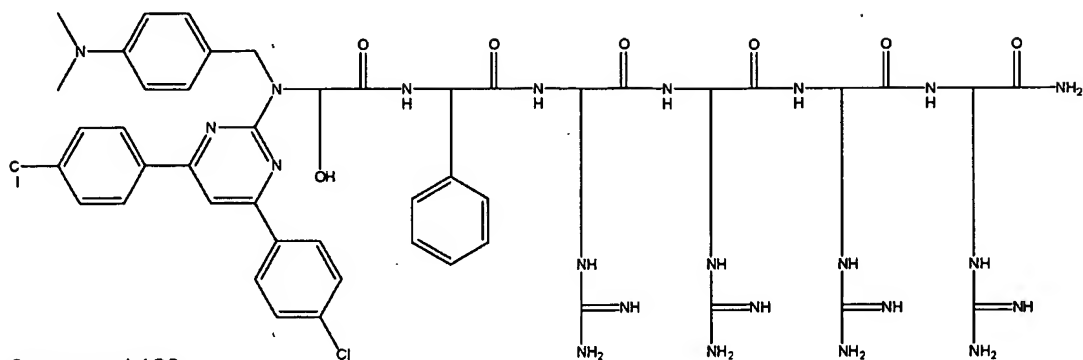
Compound 189



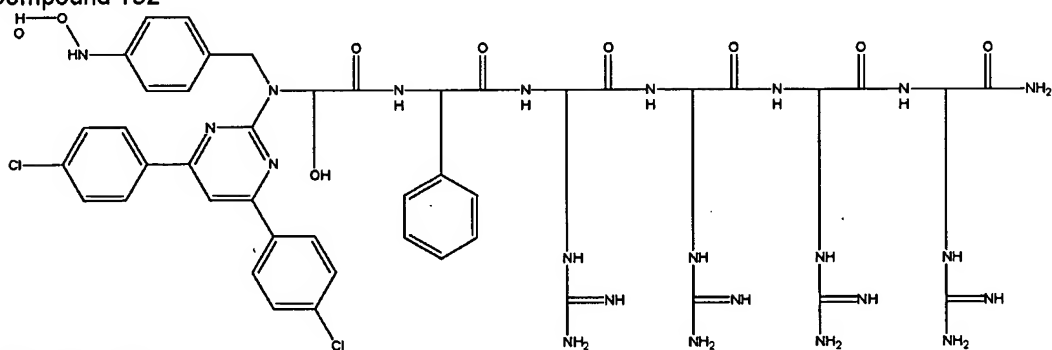
Compound 190



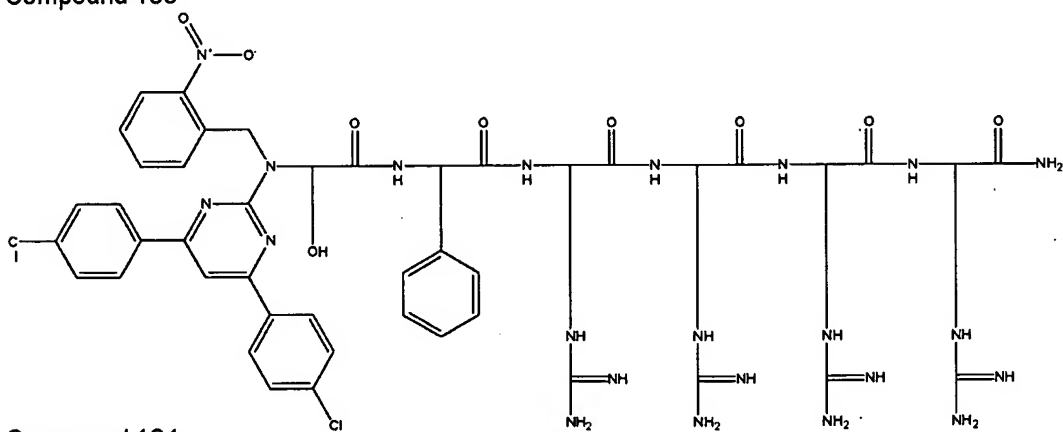
Compound 191



Compound 192



Compound 193



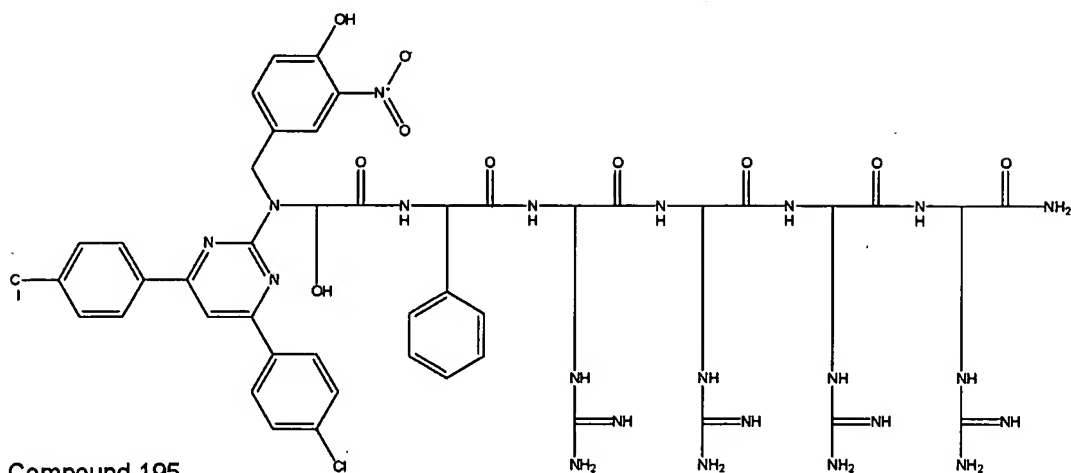
Compound 194

Applicant: David S. Lawrence

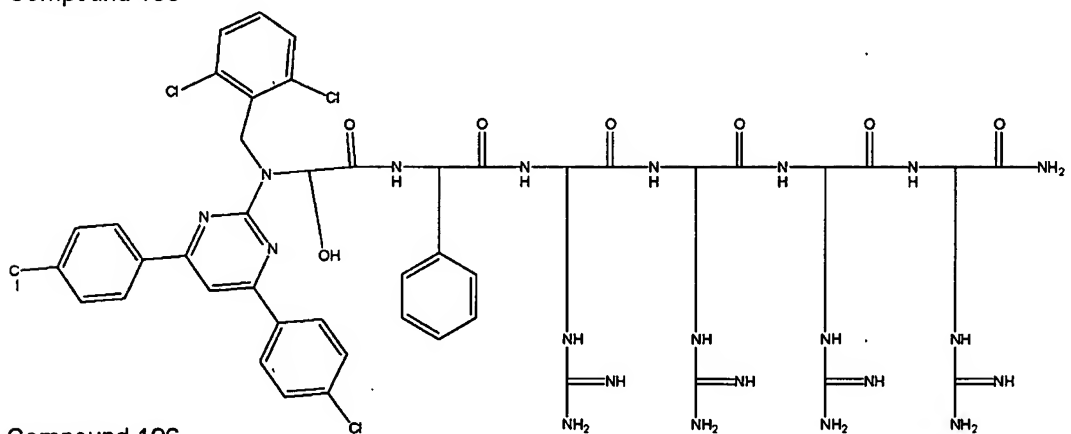
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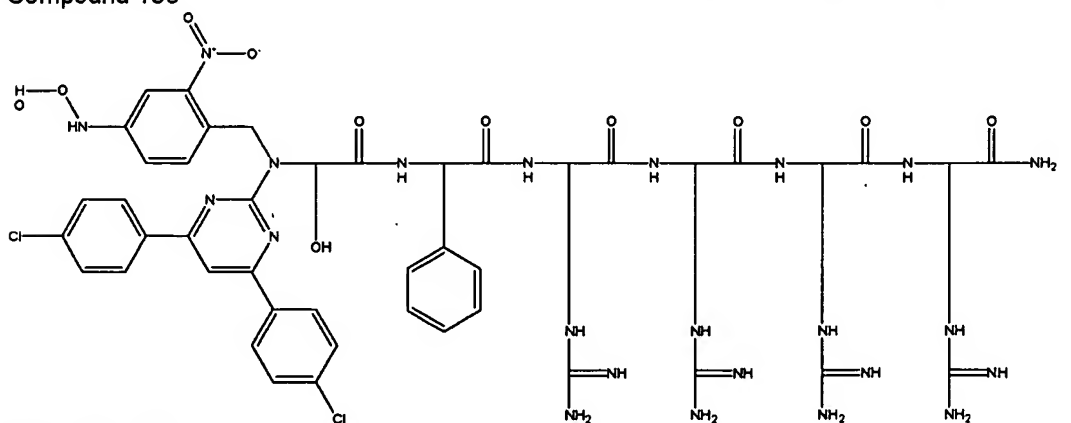
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Compound 195



Compound 196



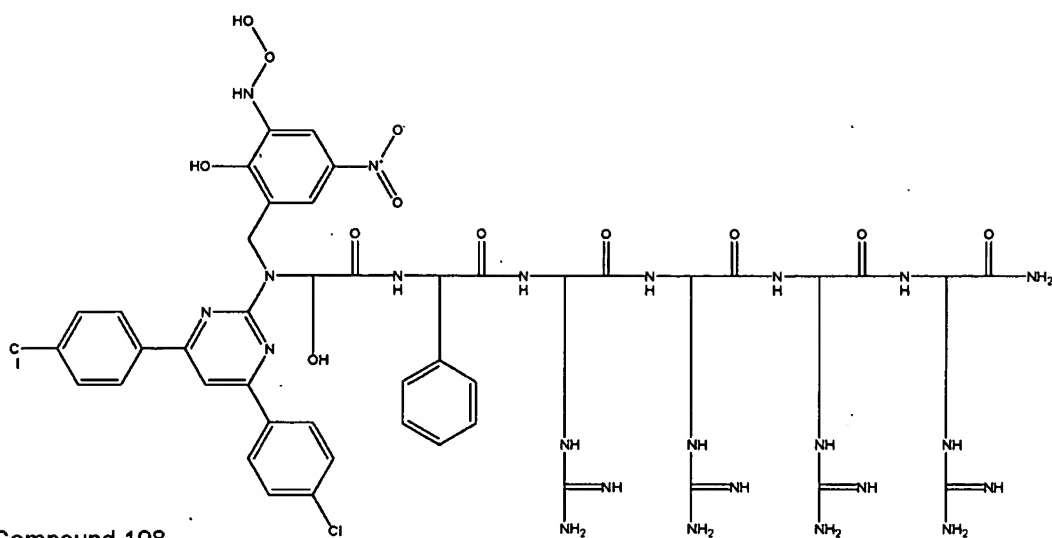
Compound 197

Applicant: David S. Lawrence

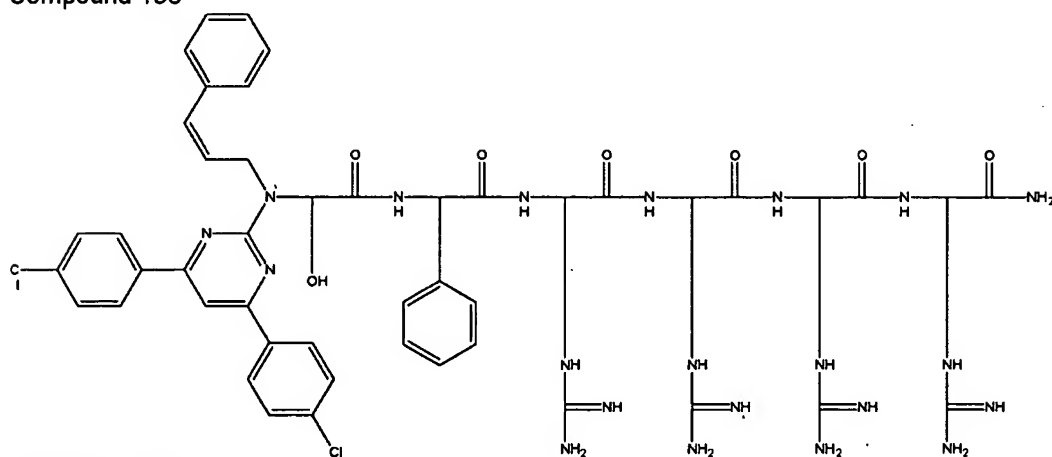
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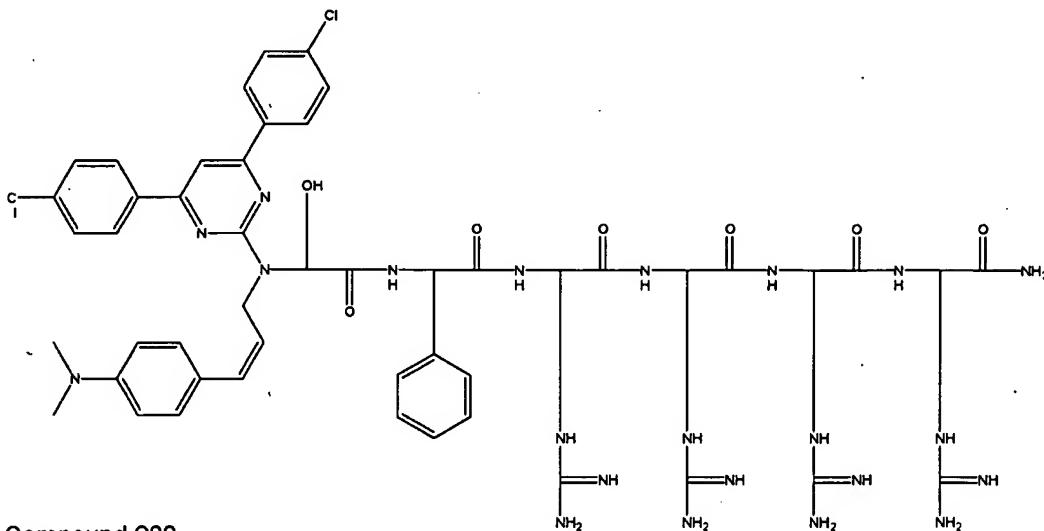


Compound 198

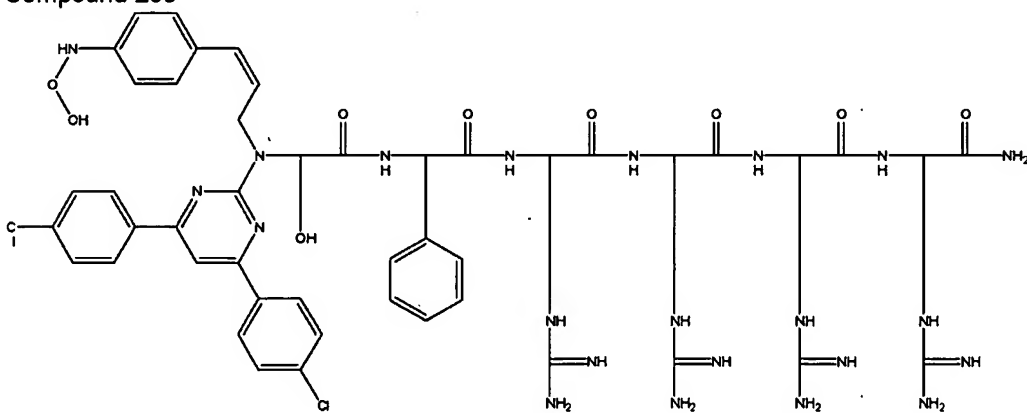


Compound 199

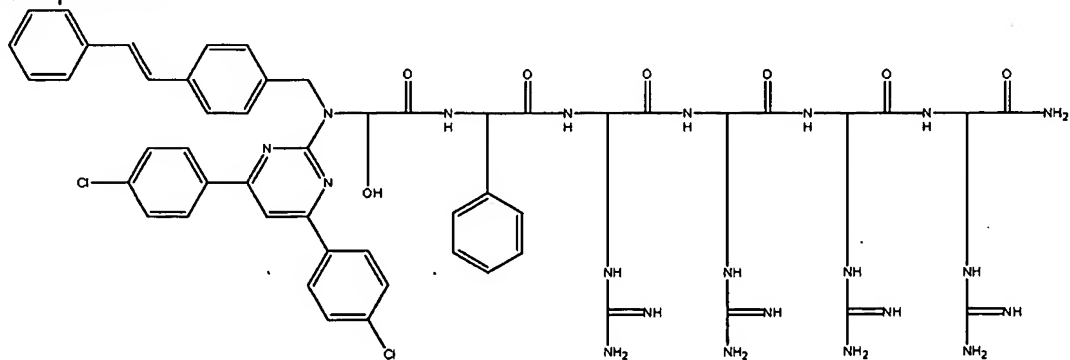
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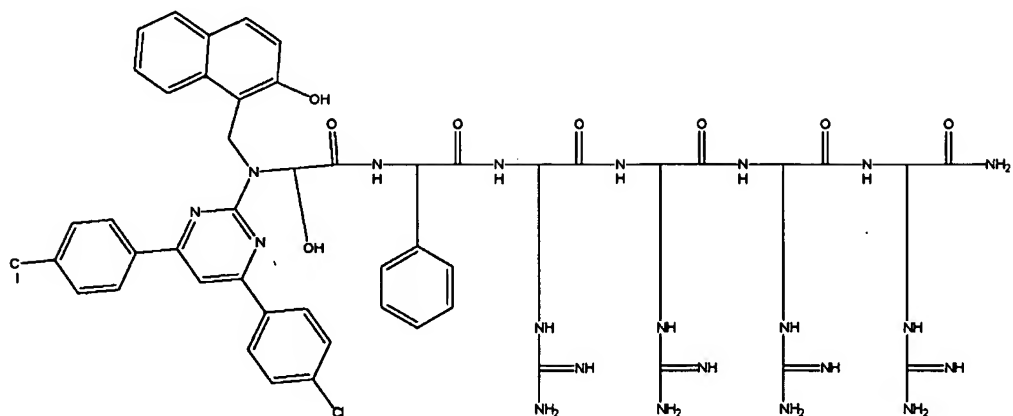
Compound 200



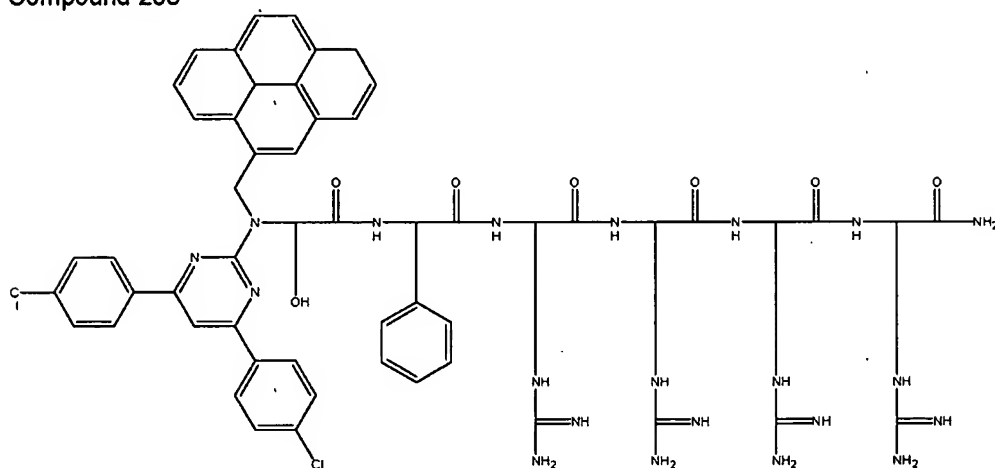
Compound 201



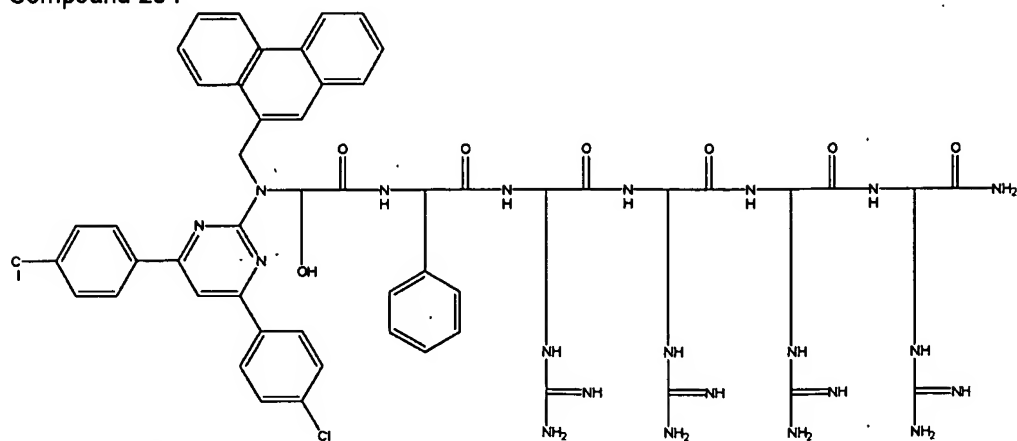
Compound 202



Compound 203

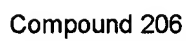


Compound 204



Compound 205

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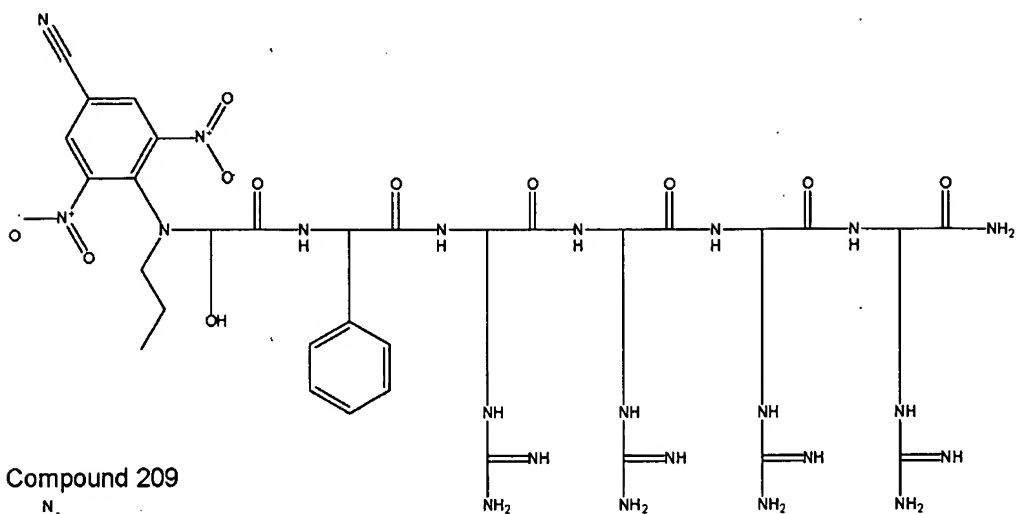


Applicant: David S. Lawrence

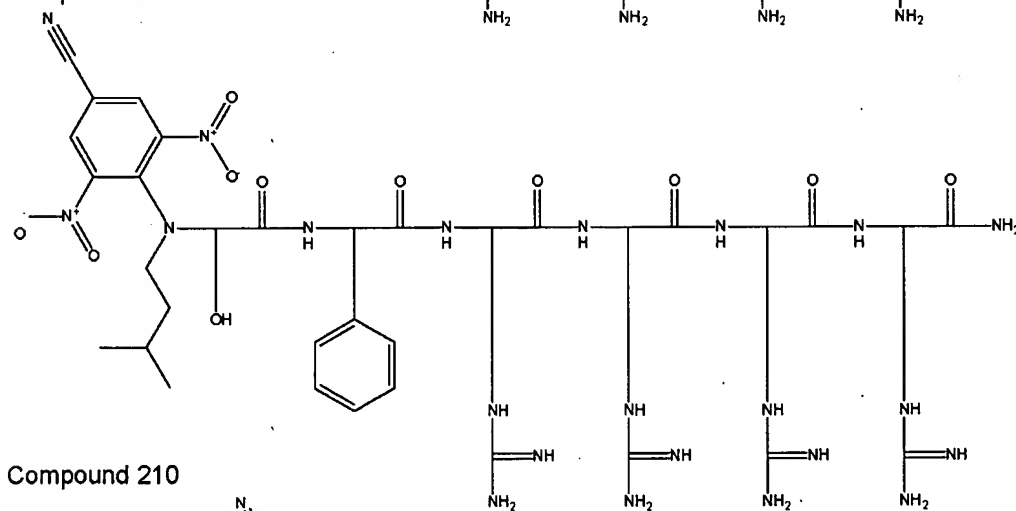
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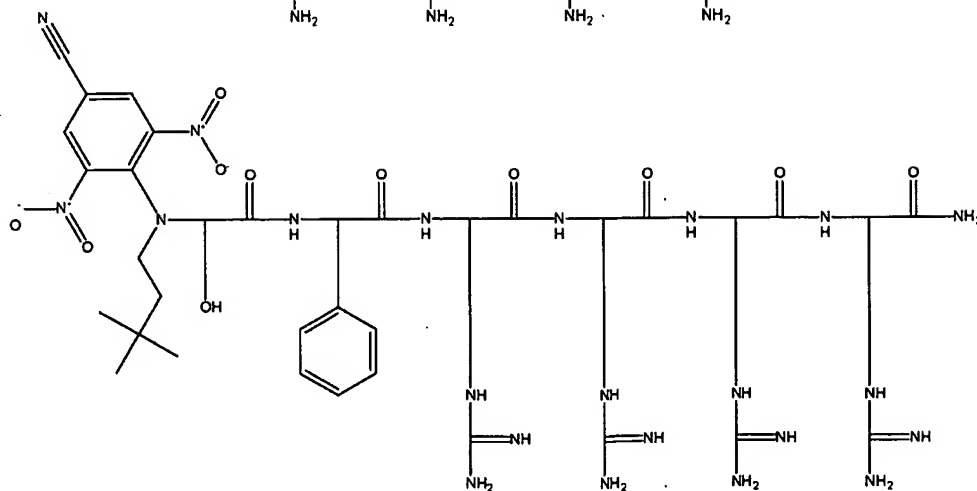


Compound 209

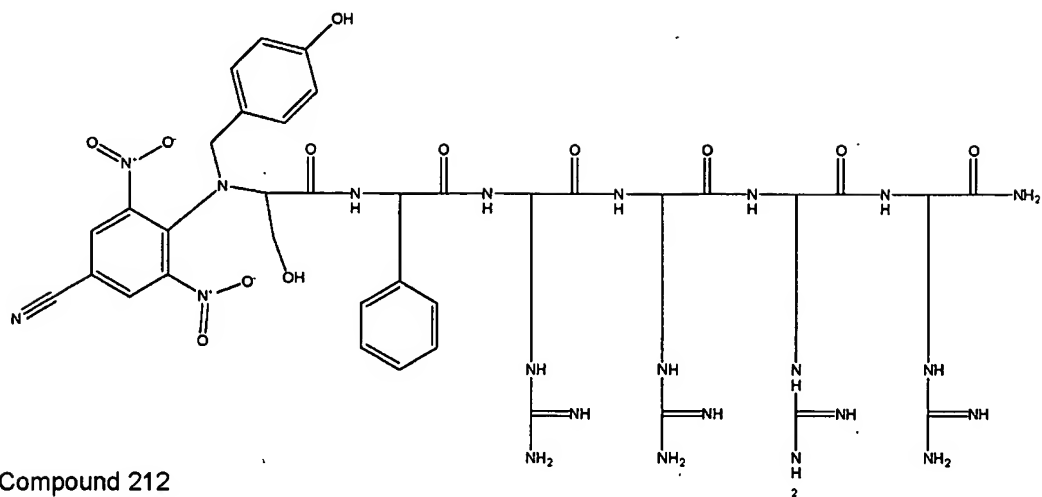


Compound 210

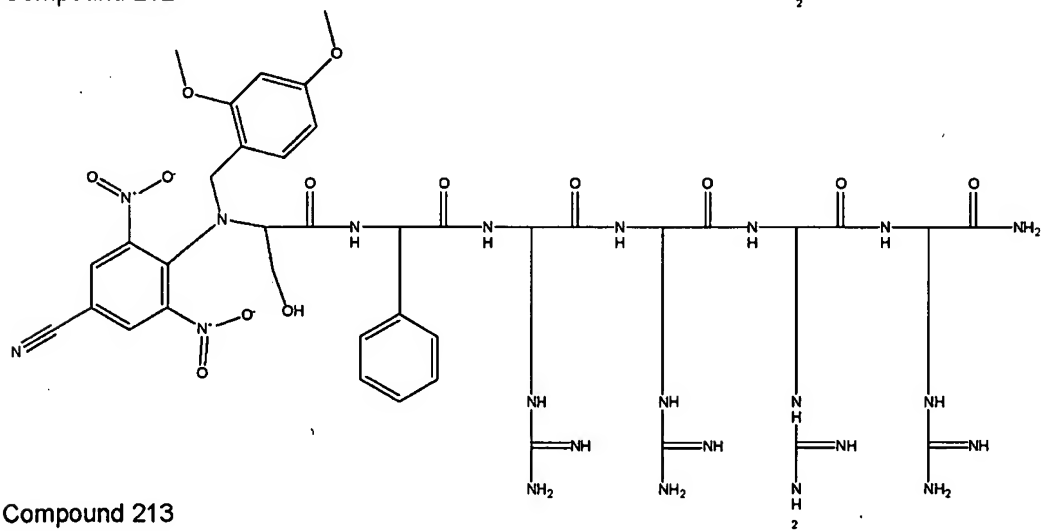
Compound 211



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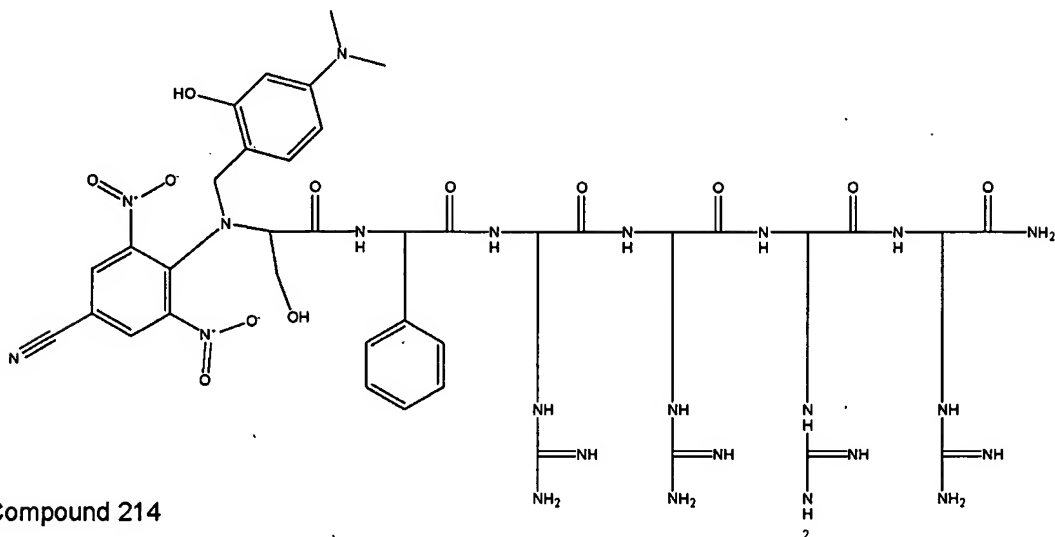


Compound 212

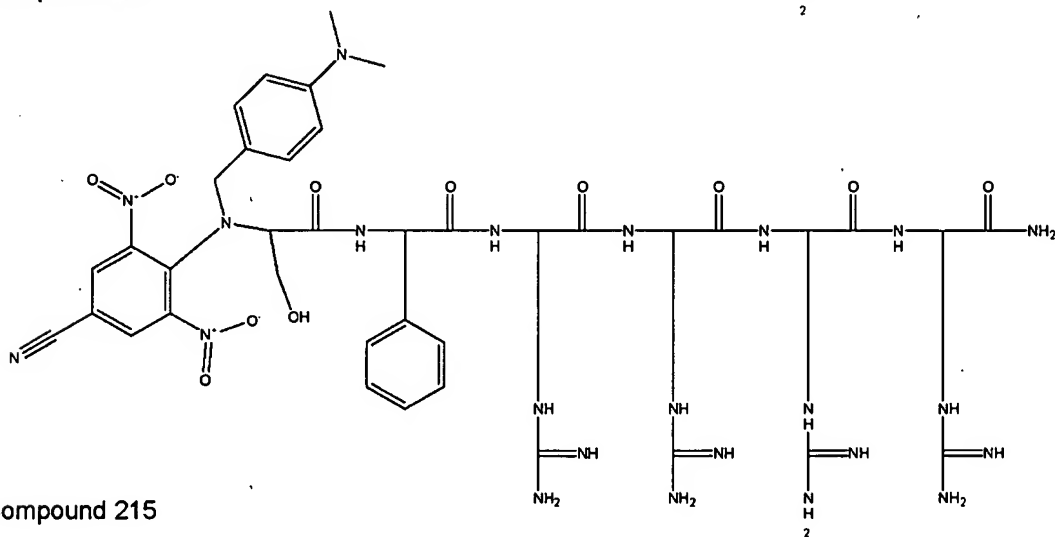


Compound 213

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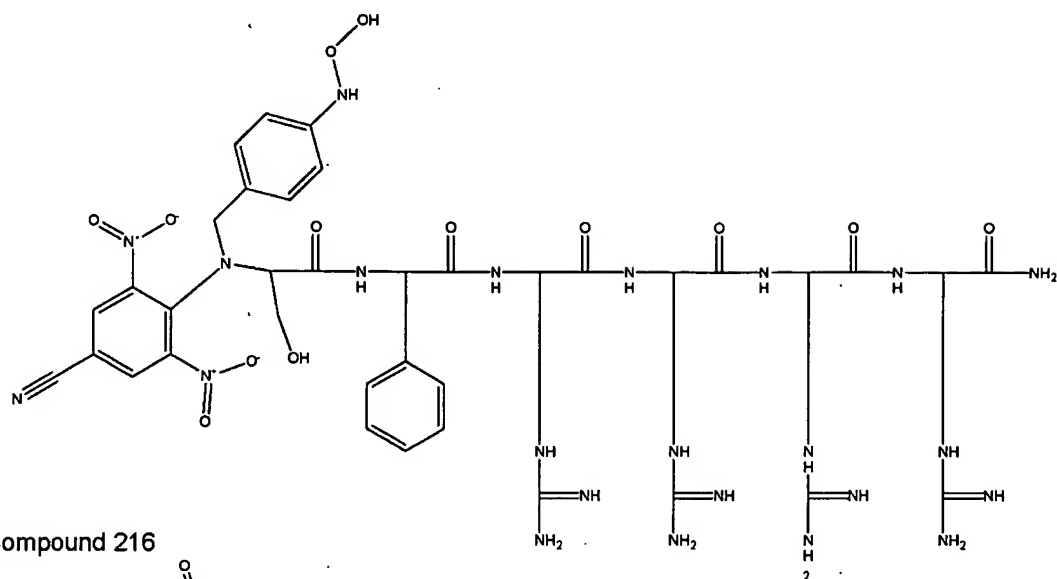


Compound 214

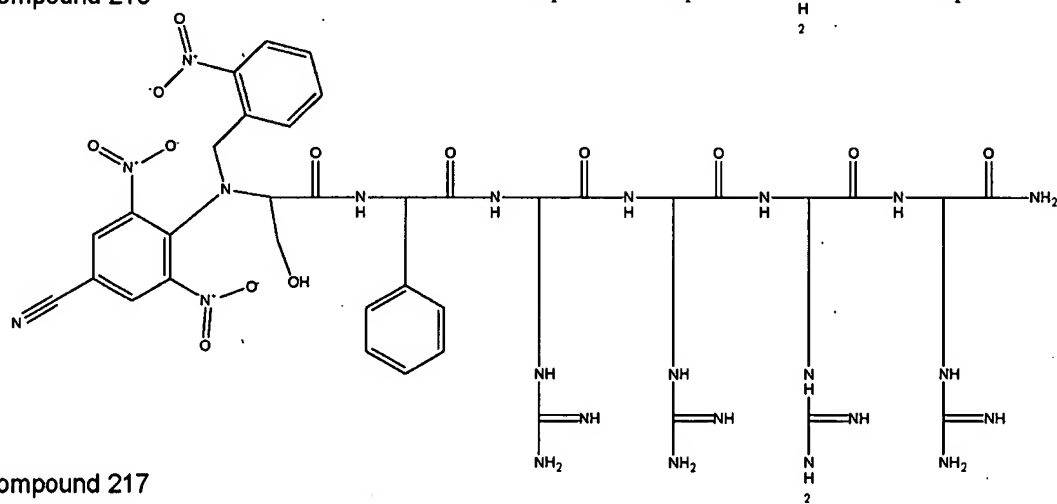


Compound 215

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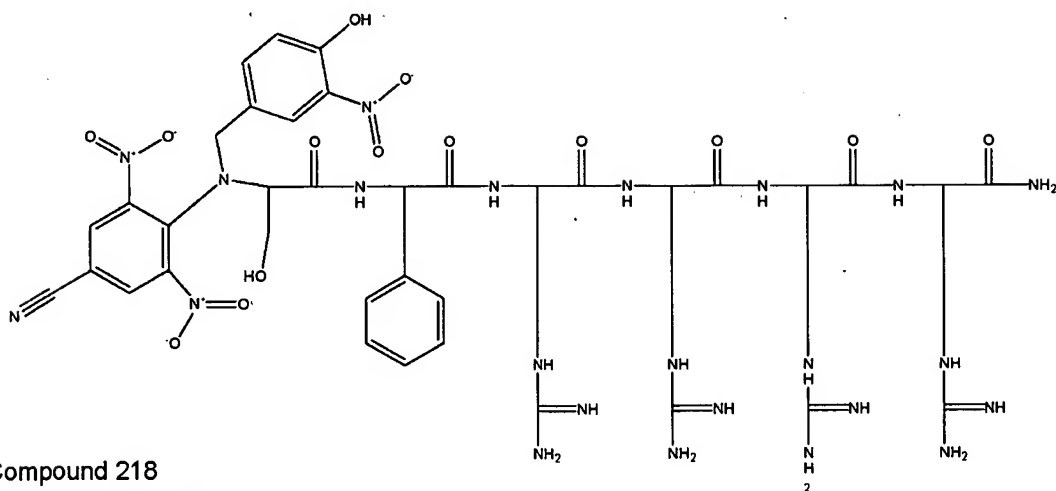


Compound 216

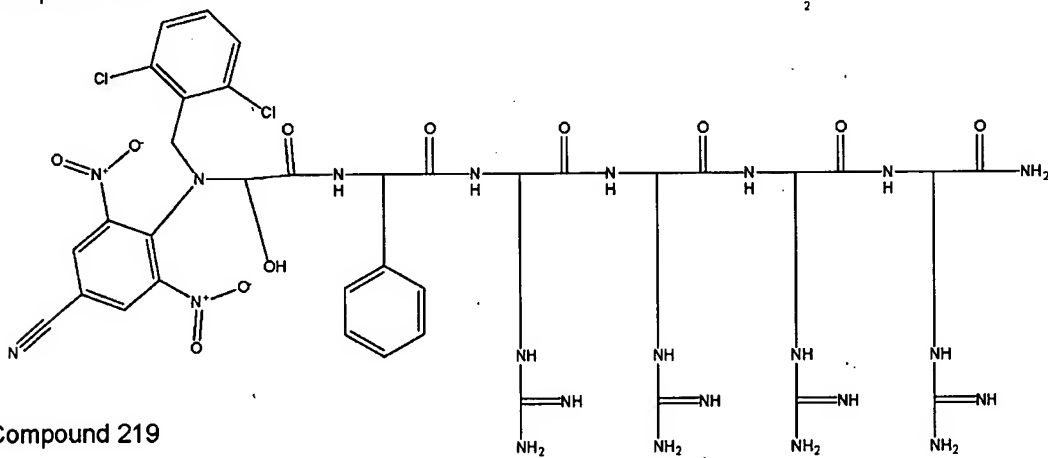


Compound 217

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Compound 218



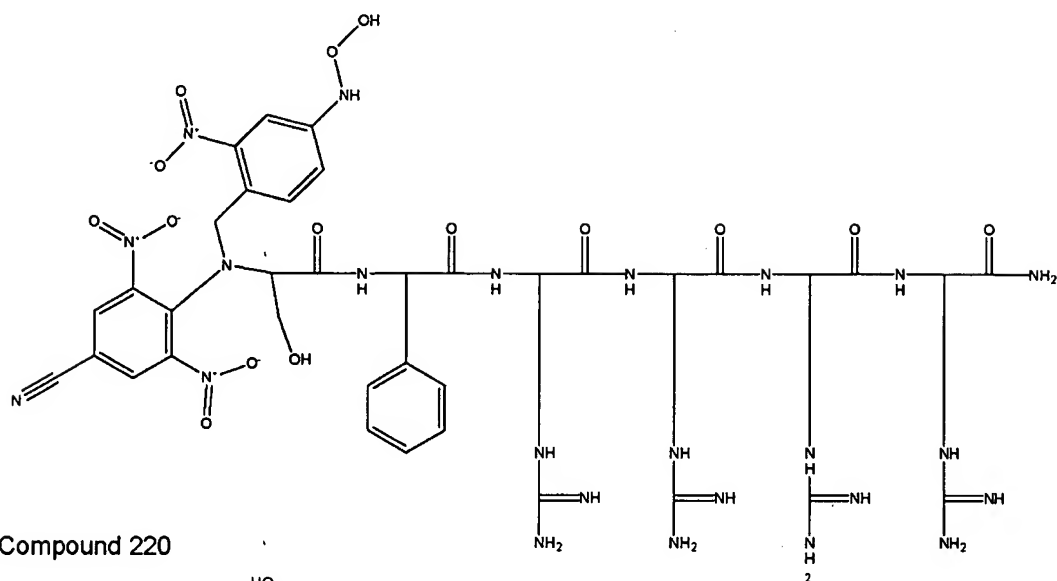
Compound 219

Applicant: David S. Lawrence

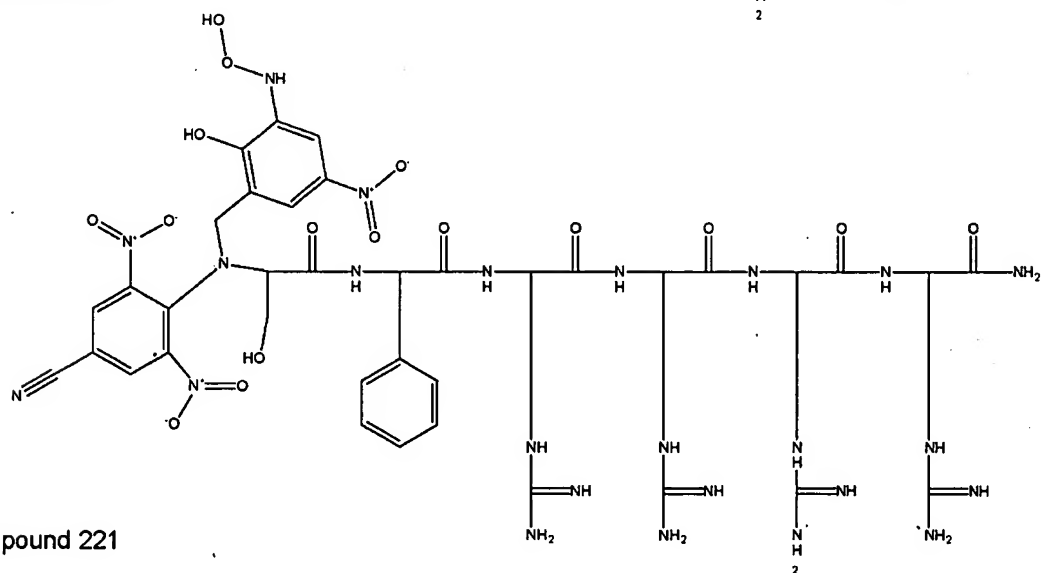
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Compound 220



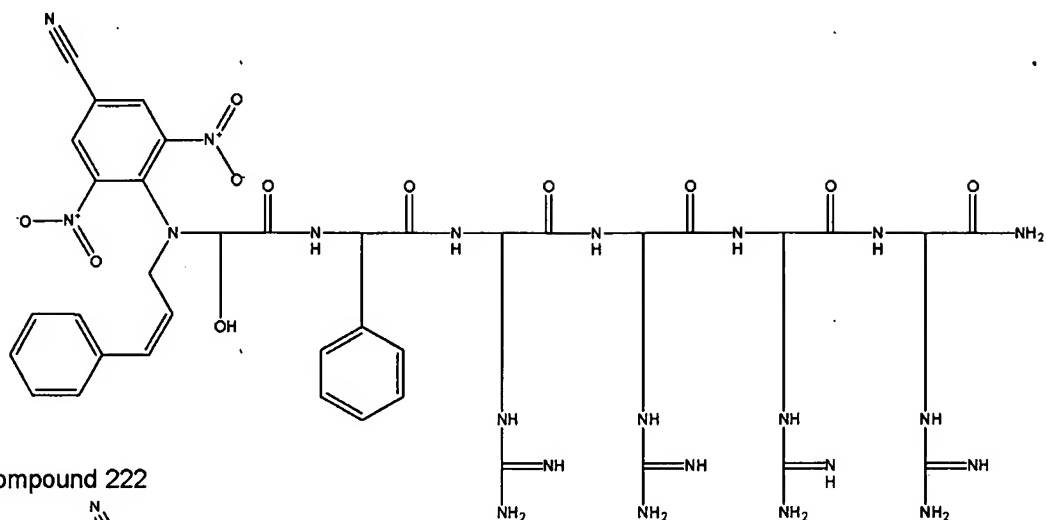
Compound 221

Applicant: David S. Lawrence

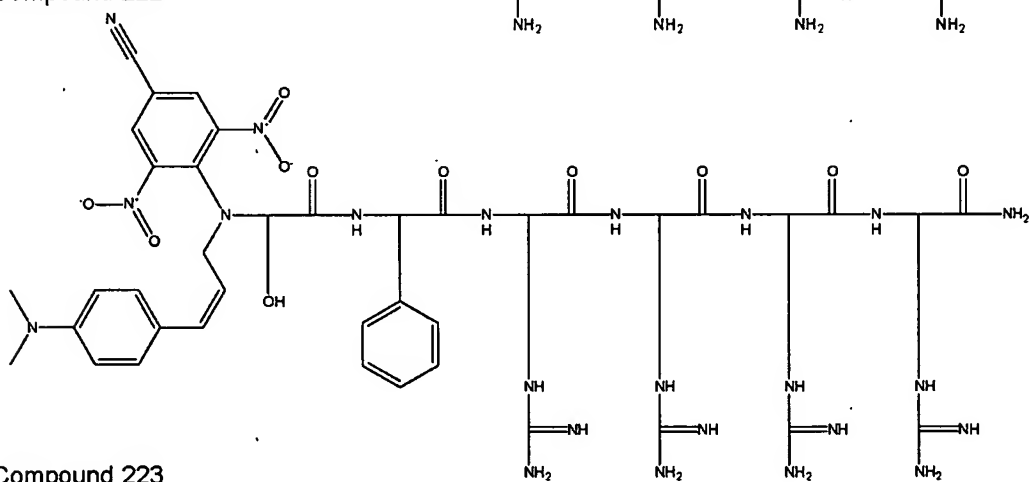
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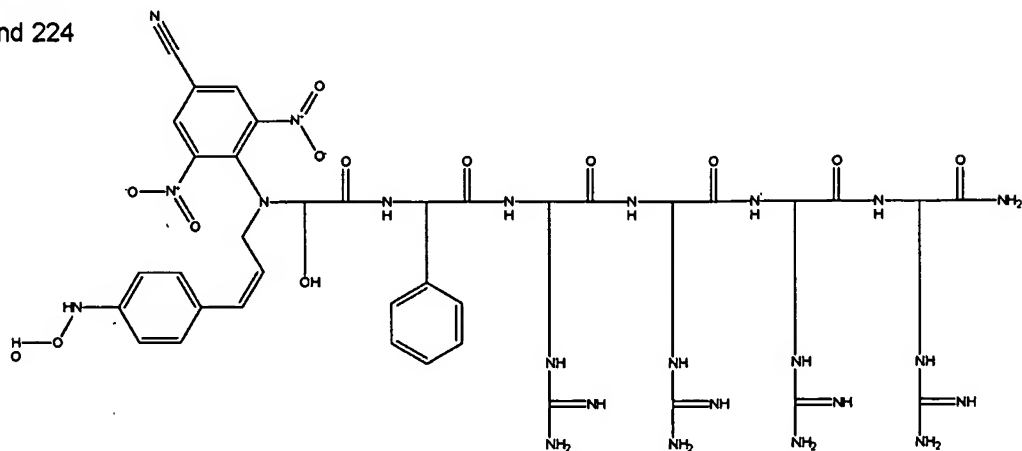


Compound 222

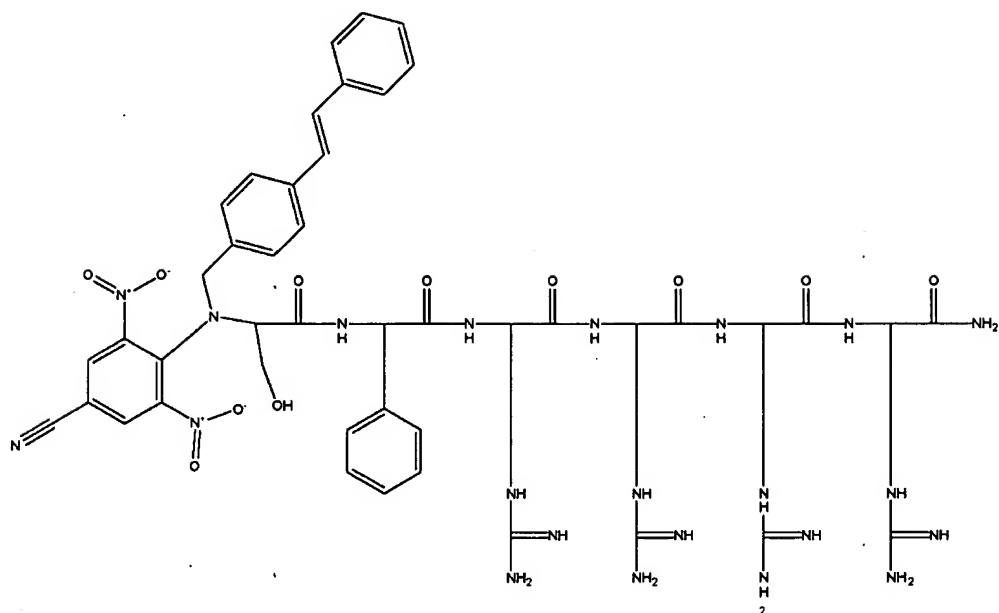


Compound 223

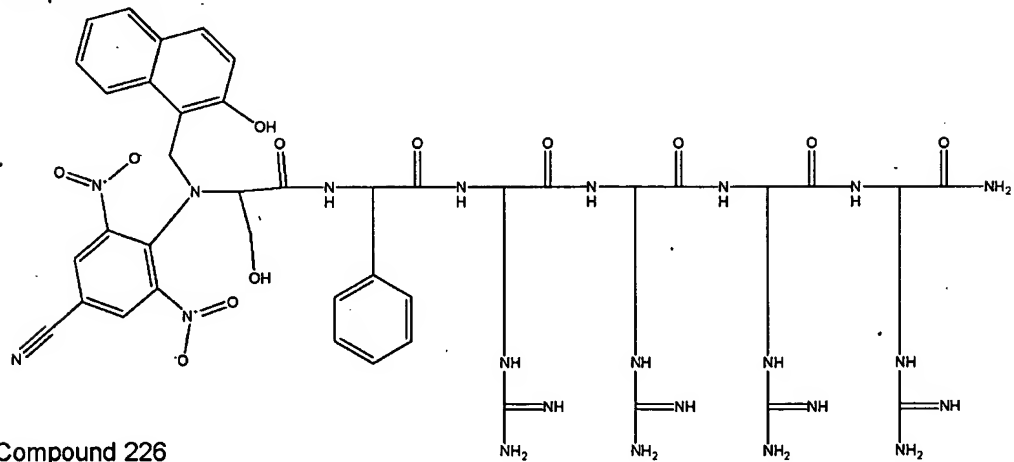
Compound 224



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Compound 225



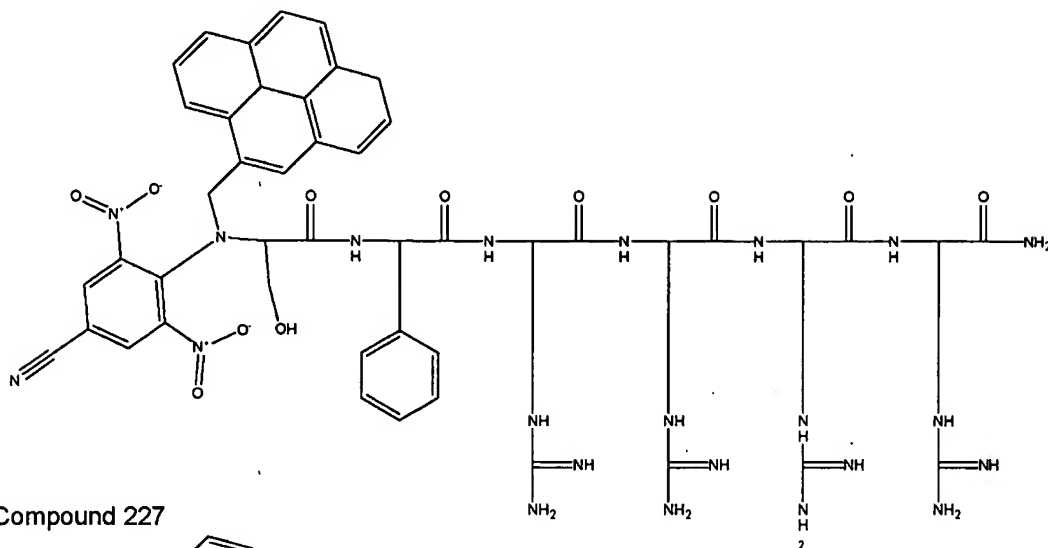
Compound 226

Applicant: David S. Lawrence

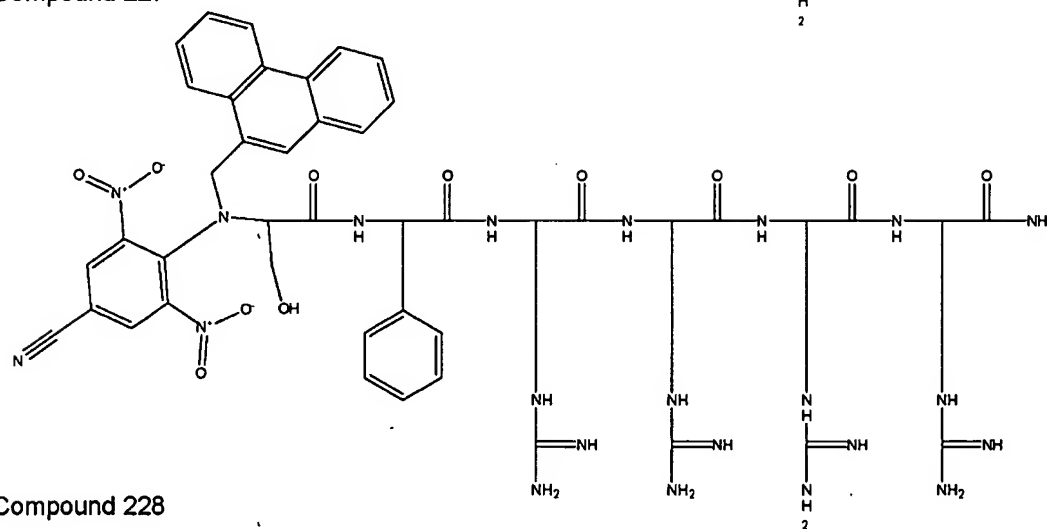
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Compound 227



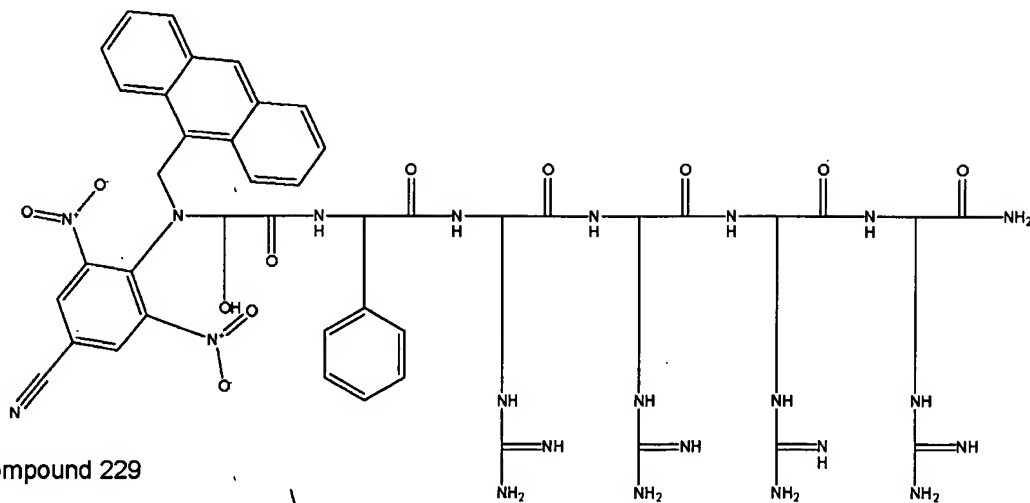
Compound 228

Applicant: David S. Lawrence

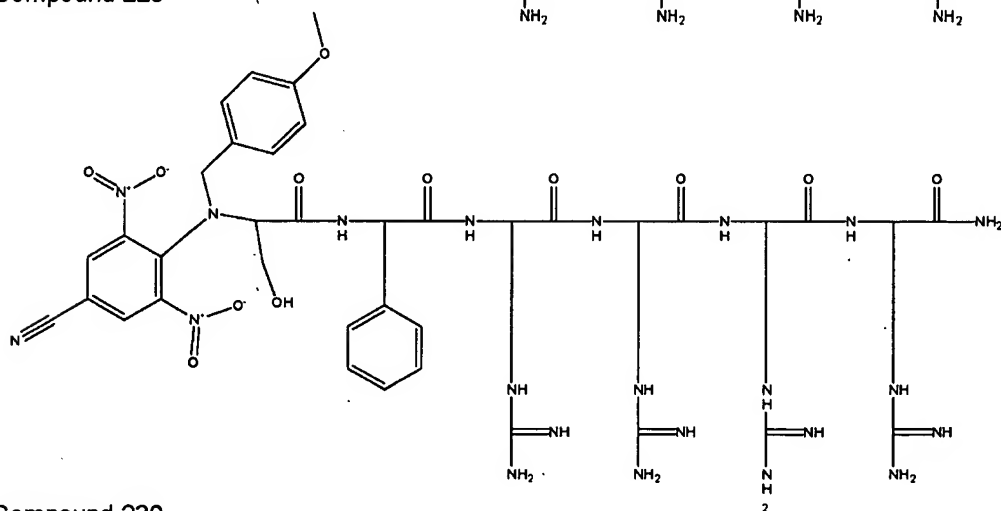
Serial No.: 10/755,086

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Compound 229



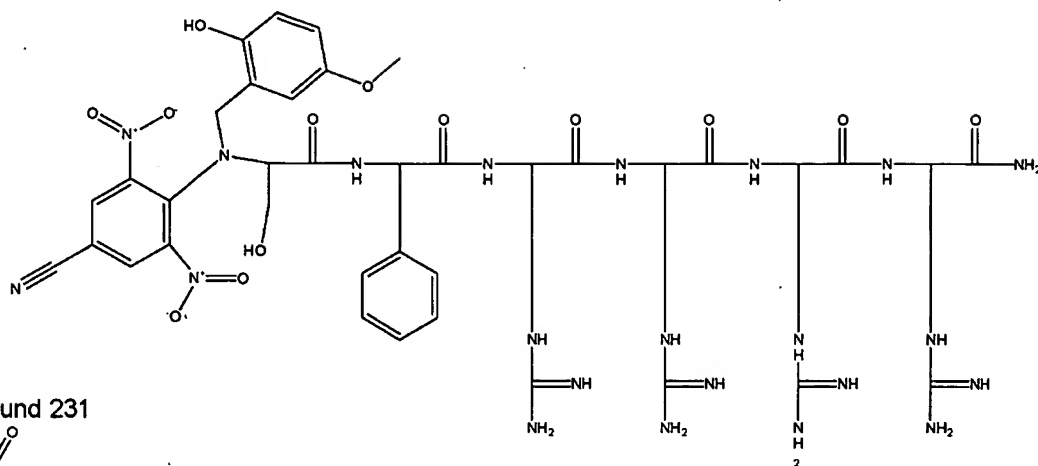
Compound 230

Applicant: David S. Lawrence

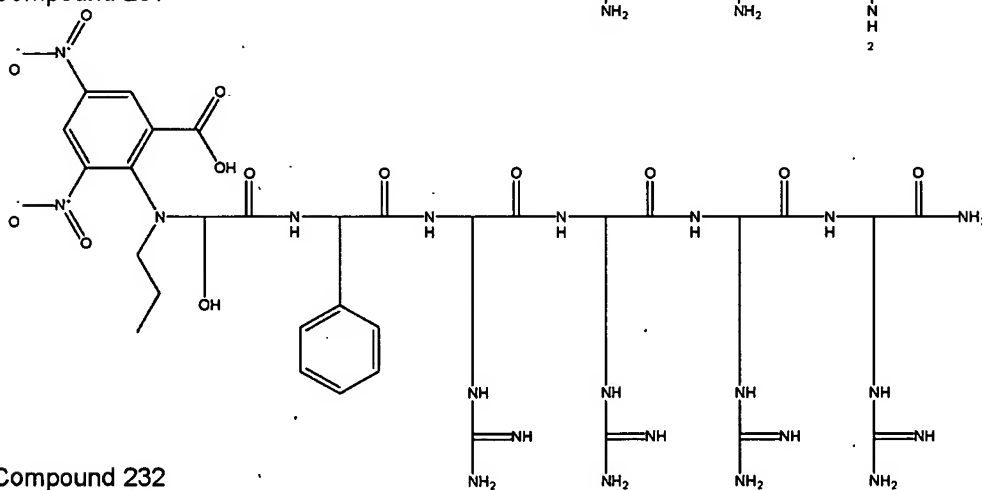
Serial No.: 10/755,086

Filed: January 9, 2004

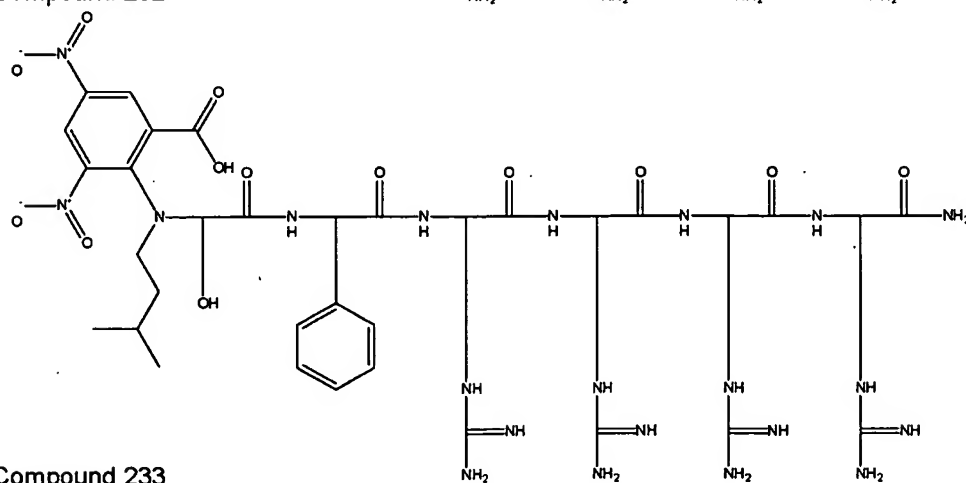
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Compound 231



Compound 232



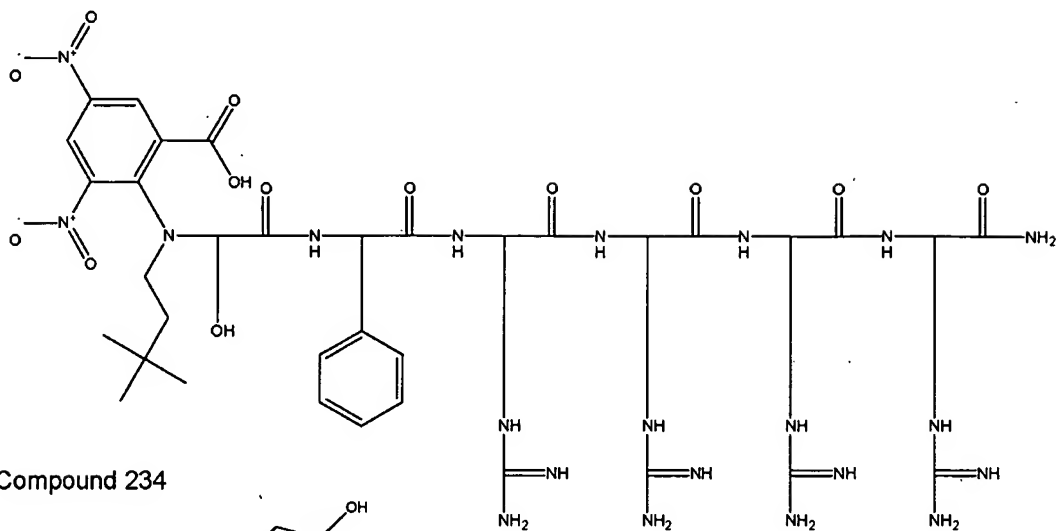
Compound 233

Applicant: David S. Lawrence

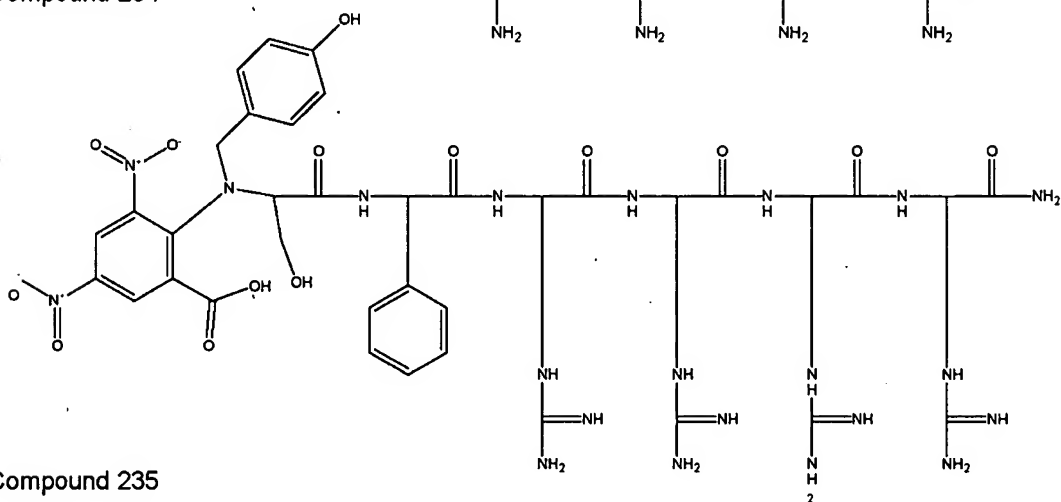
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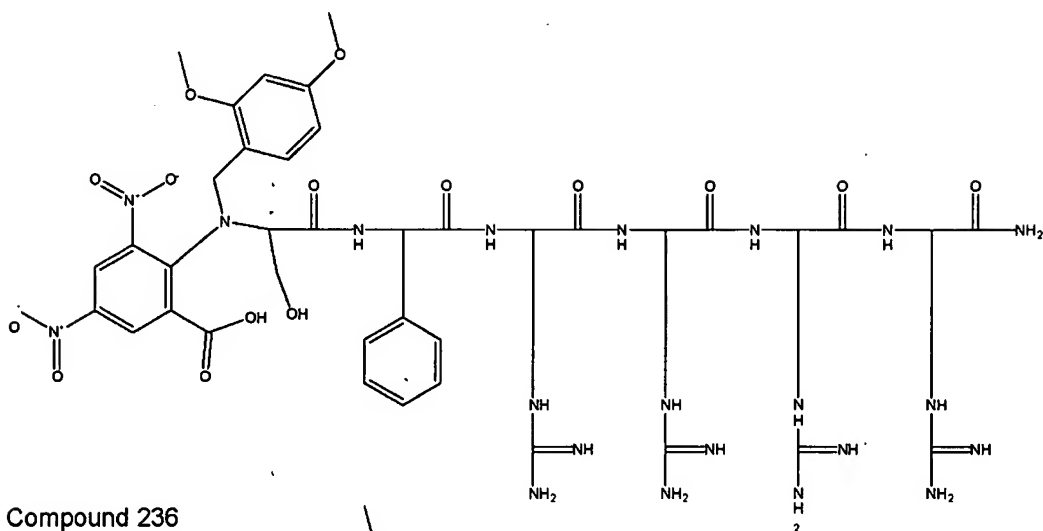


Compound 234

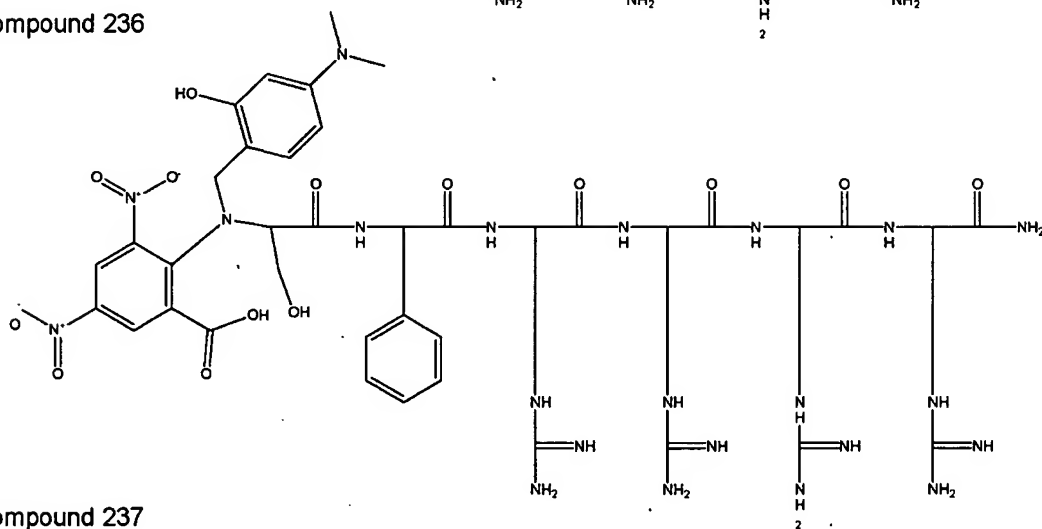


Compound 235

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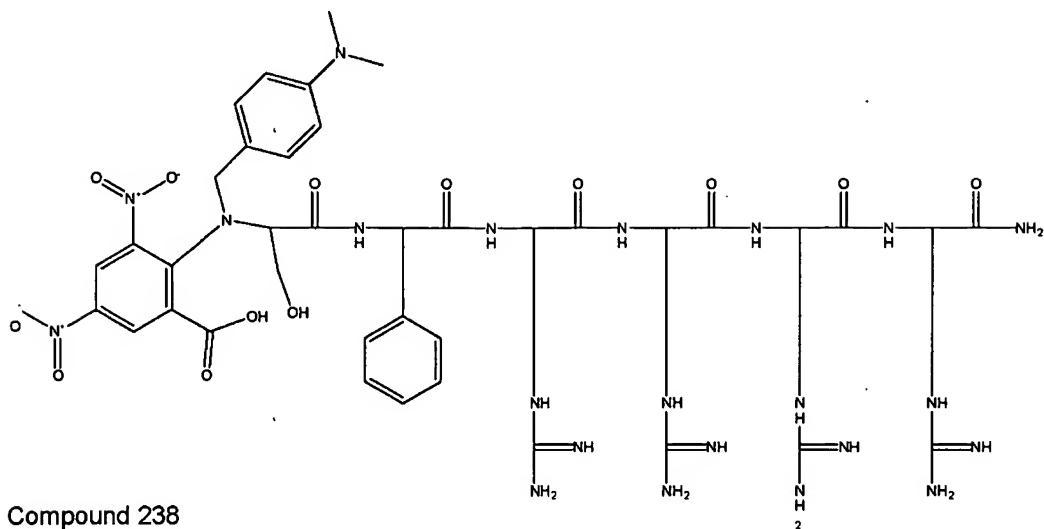


Compound 236

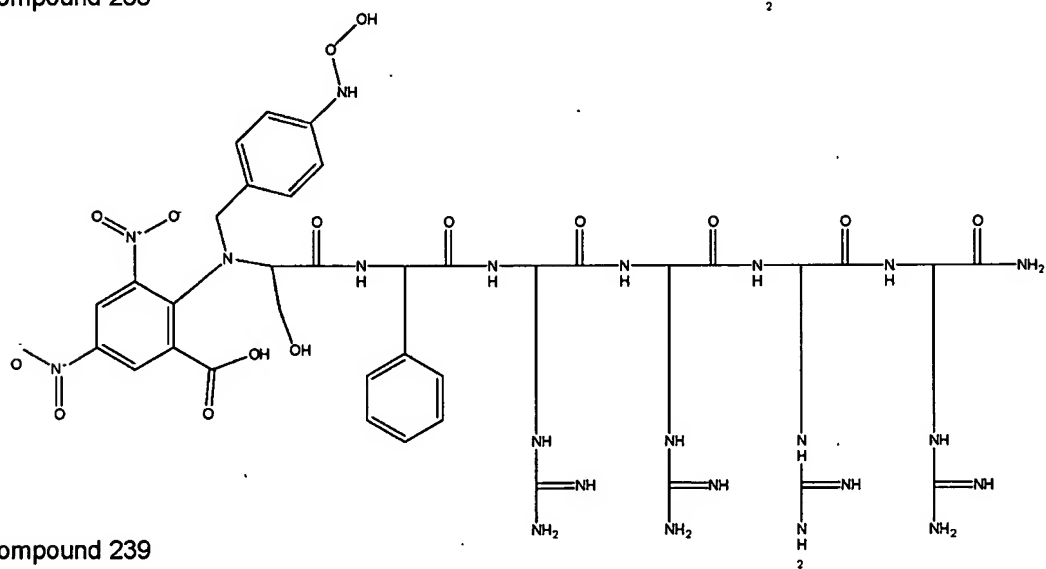


Compound 237

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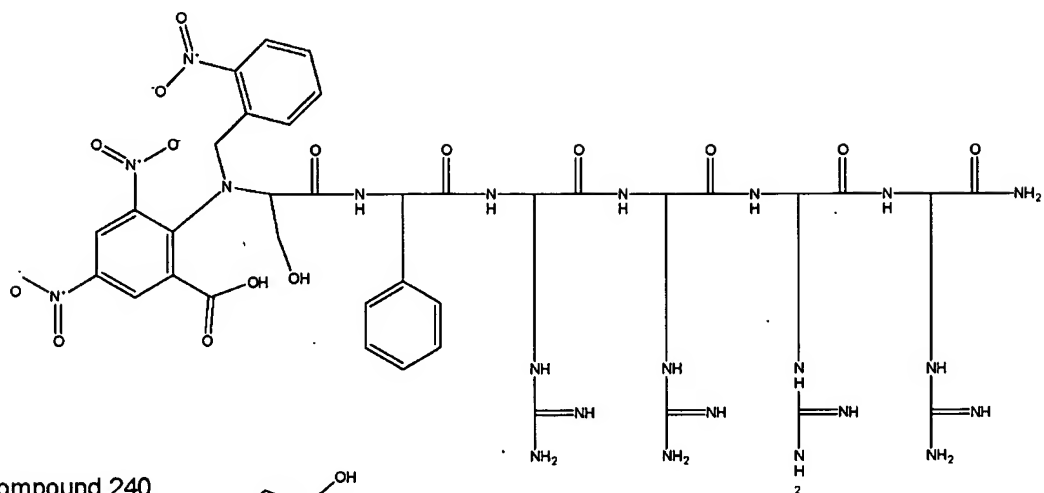


Compound 238



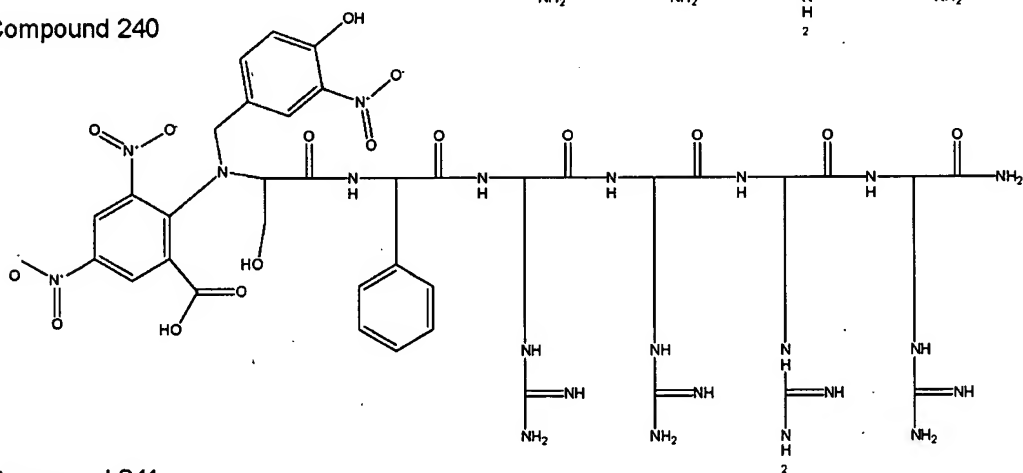
Compound 239

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Compound 240

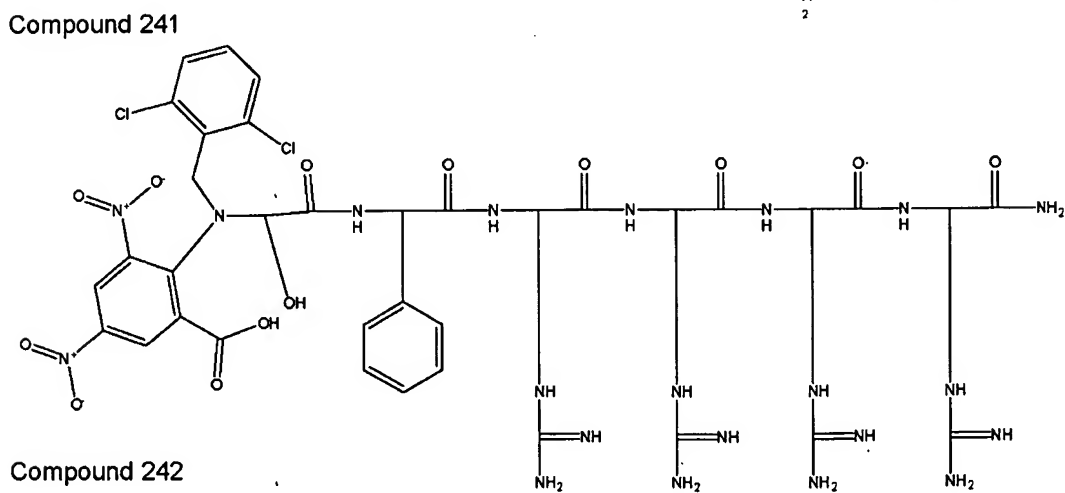
Chemical structure of Compound 240, a heptapeptide derivative. The structure shows a linear chain of seven amide bonds. The side chains are: 1) A 2,4-dinitrophenyl group attached to the nitrogen of the first amide, with a hydroxyl group at the 3-position. 2) A hydroxymethyl group (-CH₂OH). 3) A benzyl group (-CH₂Ph). 4) A hydrazinyl group (-CH₂NH-NH₂). 5) A hydrazinyl group (-CH₂NH-NH₂). 6) A hydrazinyl group (-CH₂NH-NH₂). 7) A hydrazinyl group (-CH₂NH-NH₂). The terminal amide group is a primary amide (-CONH₂).



Compound 241

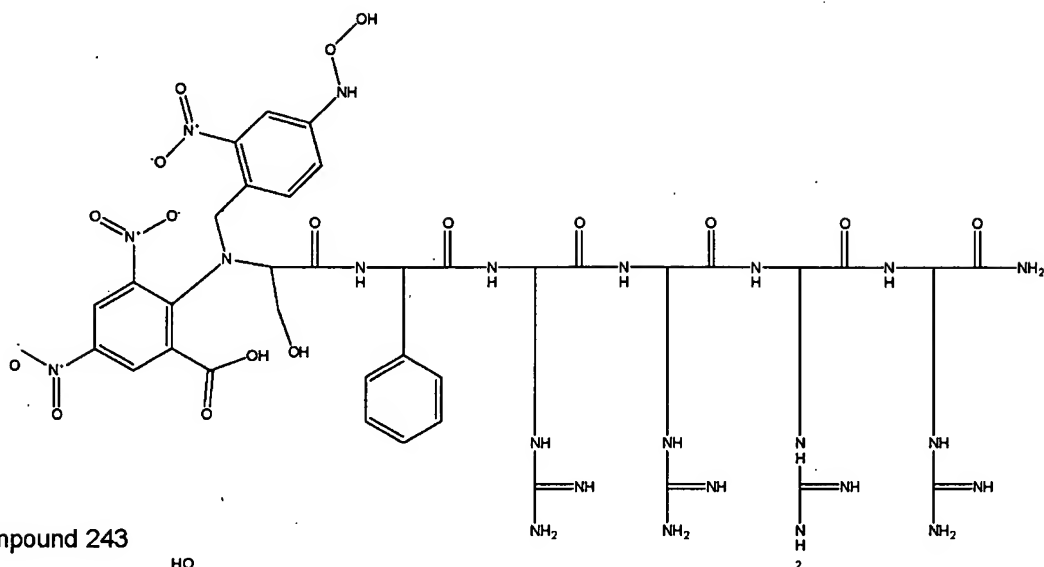
2

Compound 242

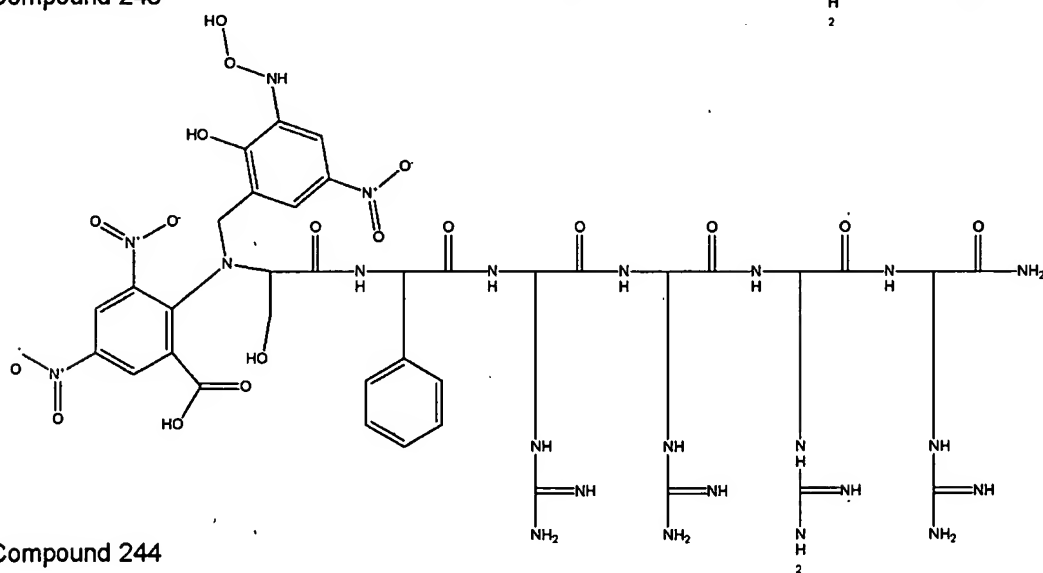


Compound 242

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Compound 243



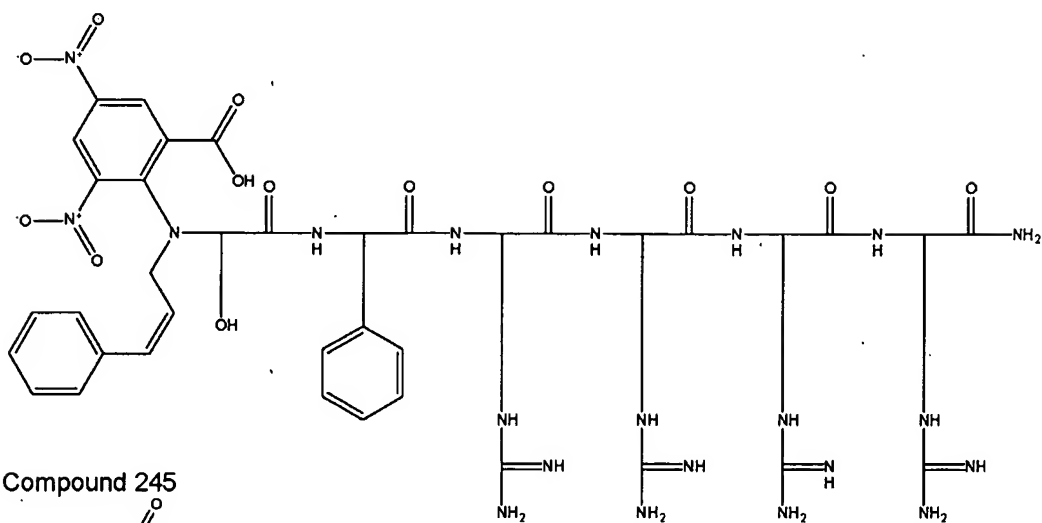
Compound 244

Applicant: David S. Lawrence

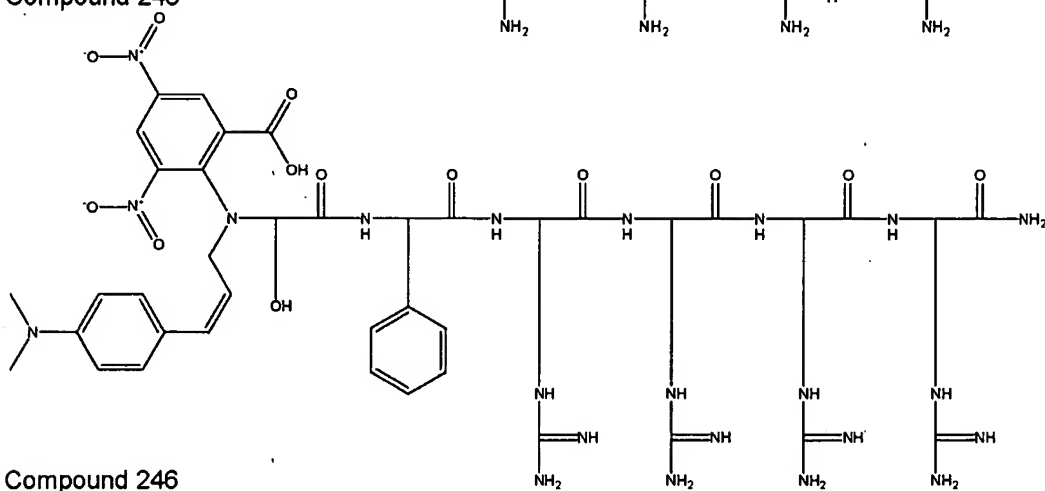
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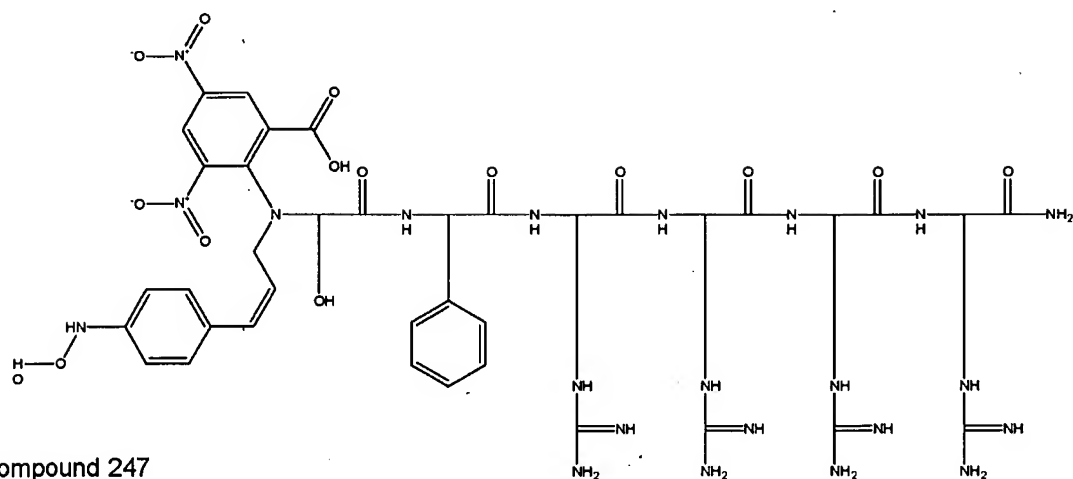


Compound 245

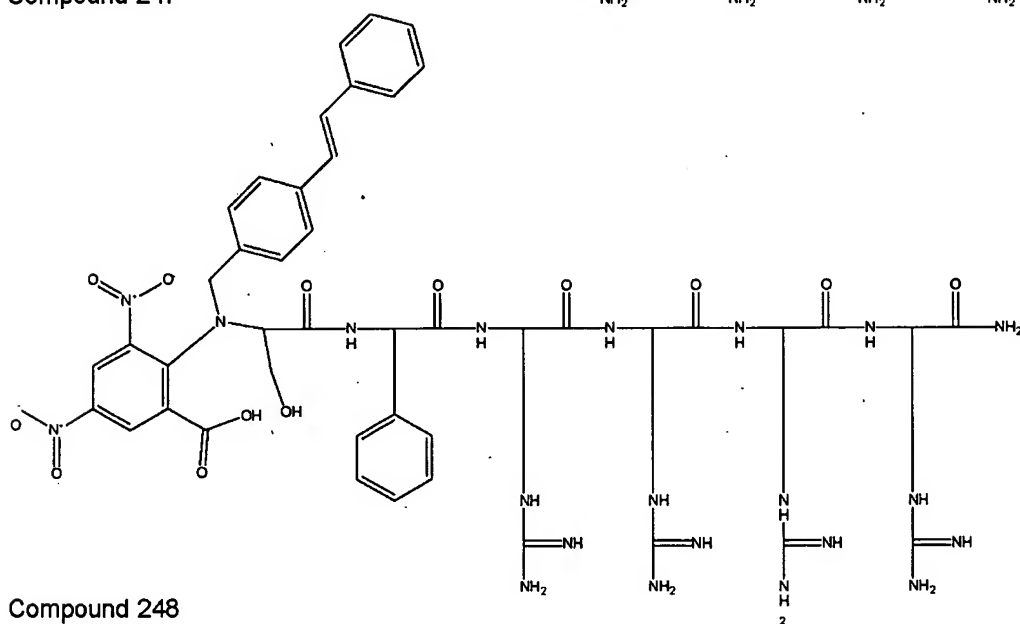


Compound 246

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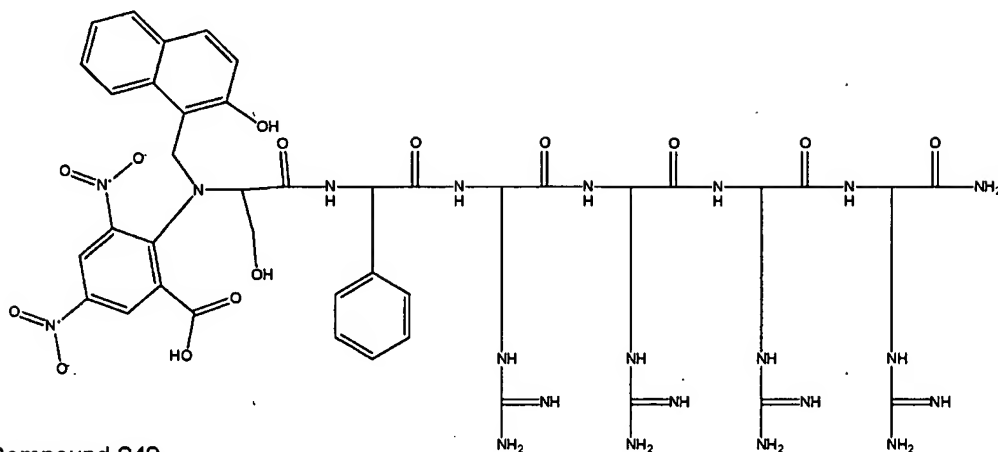


Compound 247

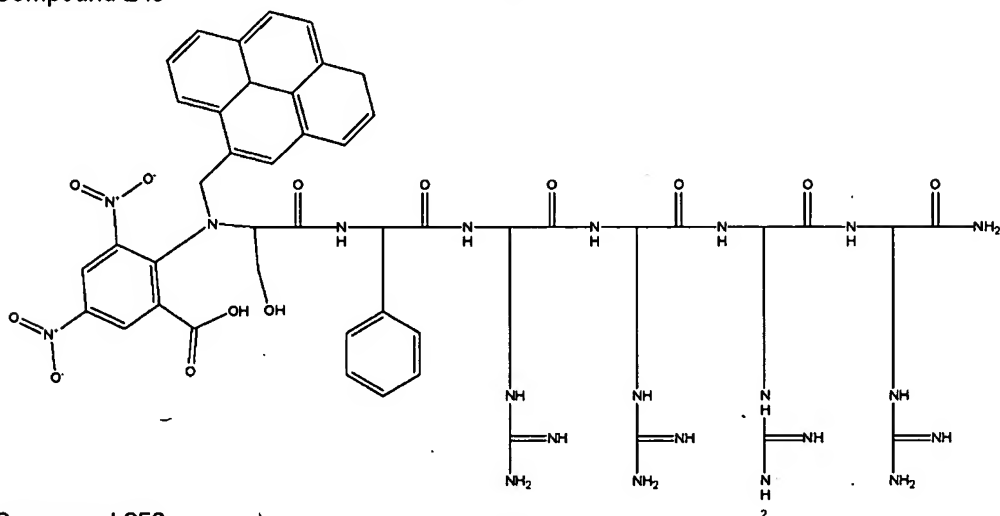


Compound 248

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Compound 249



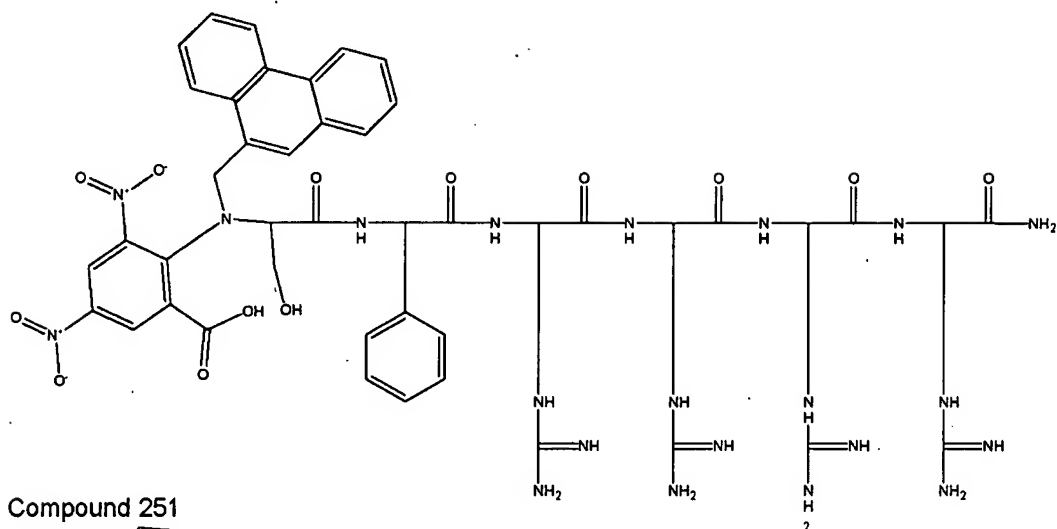
Compound 250

Applicant: David S. Lawrence

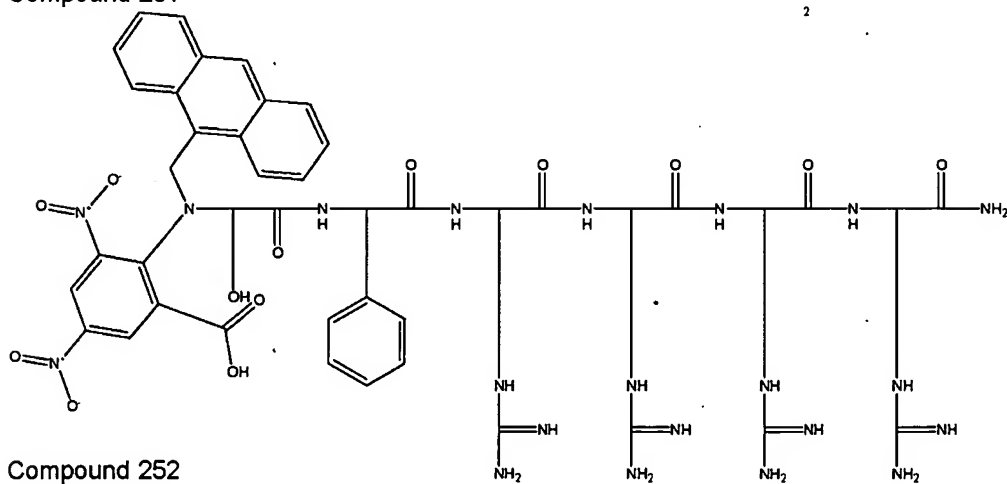
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Compound 251



Compound 252

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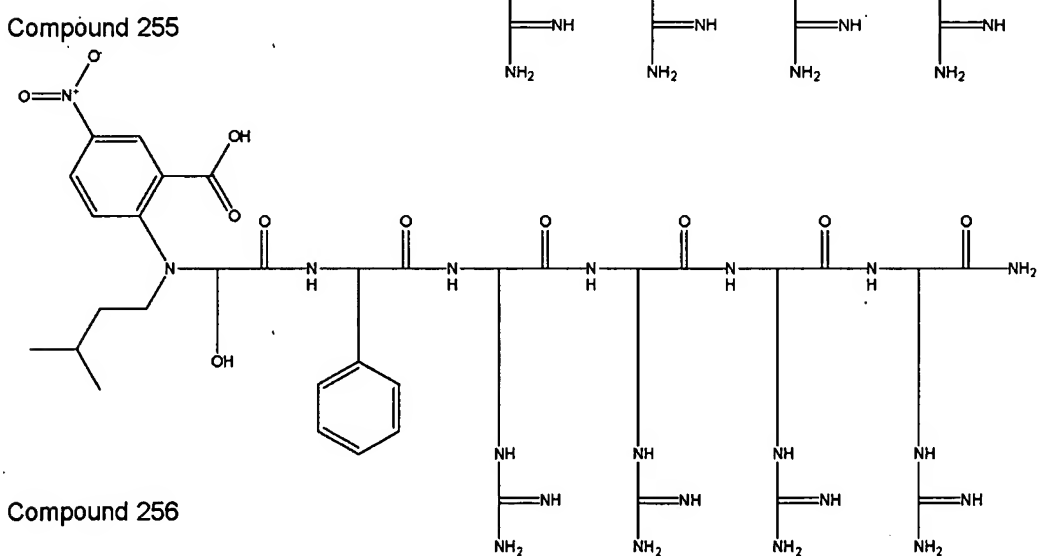
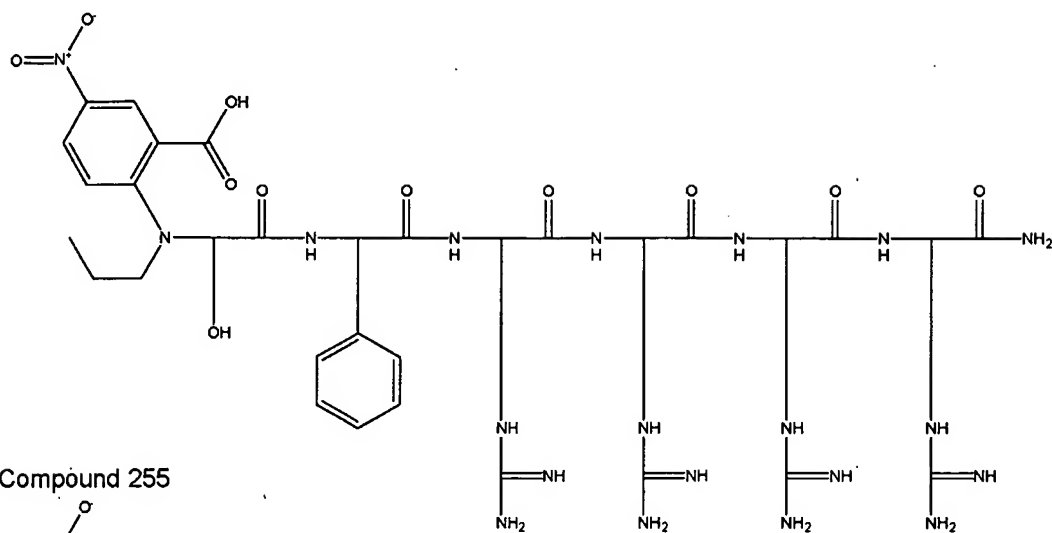


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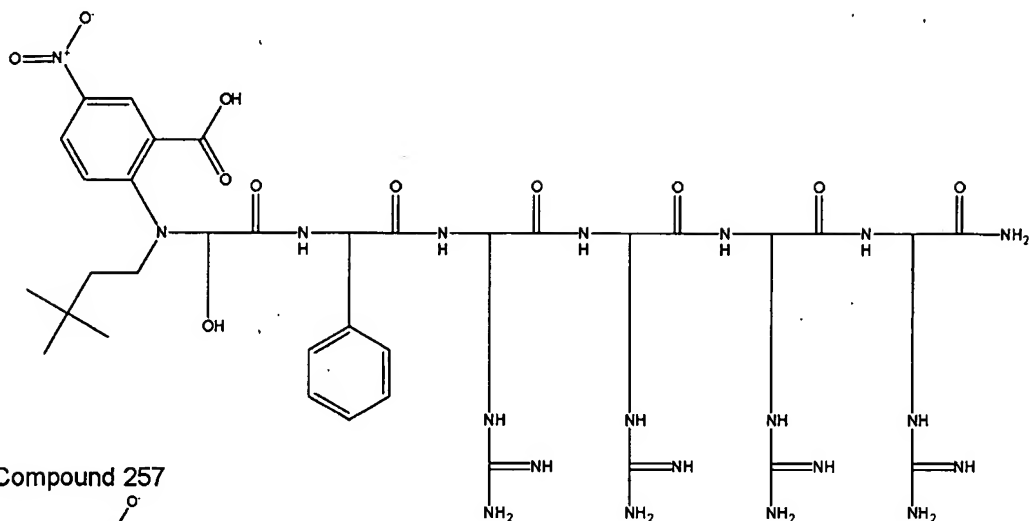


Applicant: David S. Lawrence

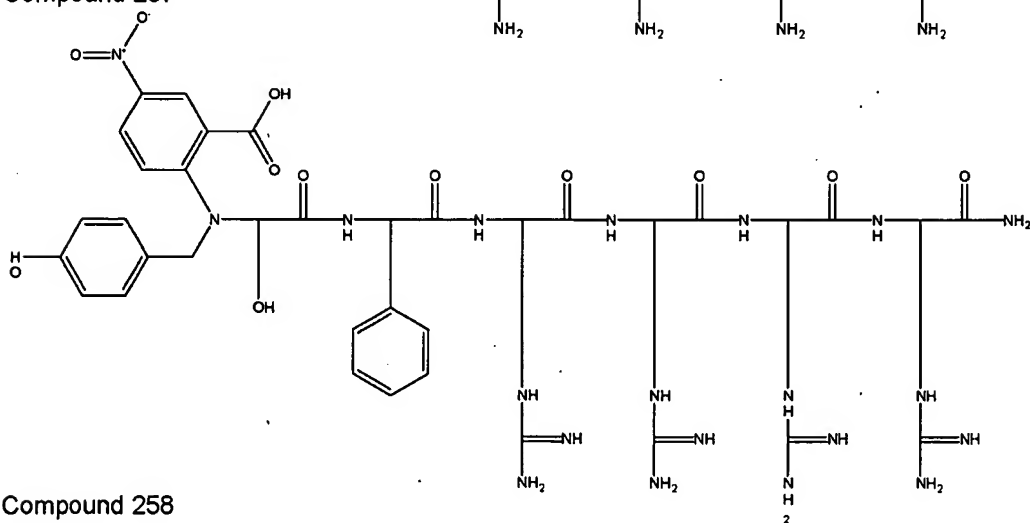
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Compound 257



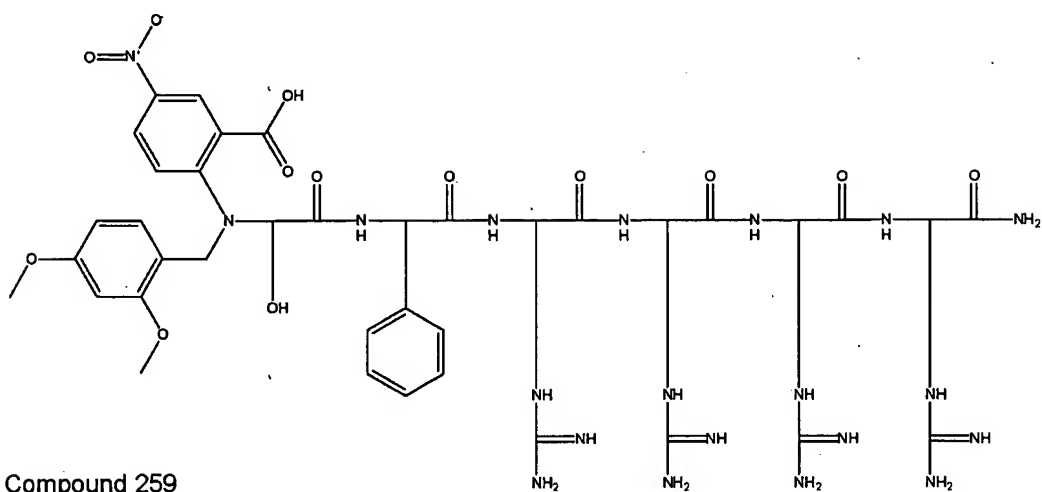
Compound 258

Applicant: David S. Lawrence

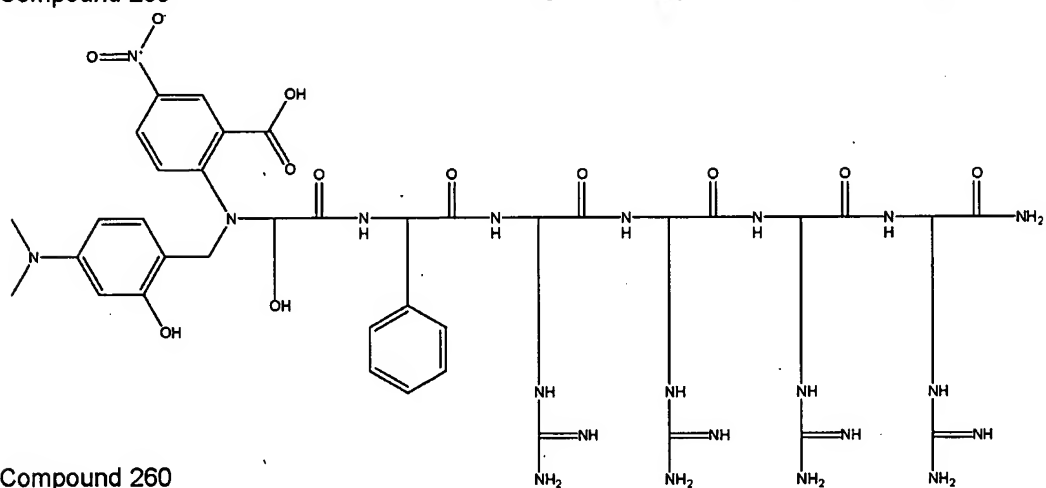
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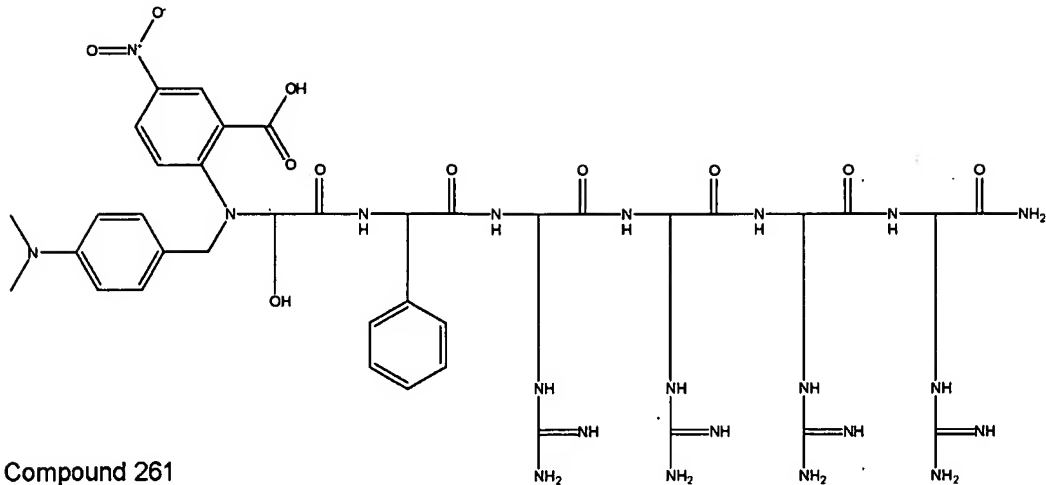


Compound 259

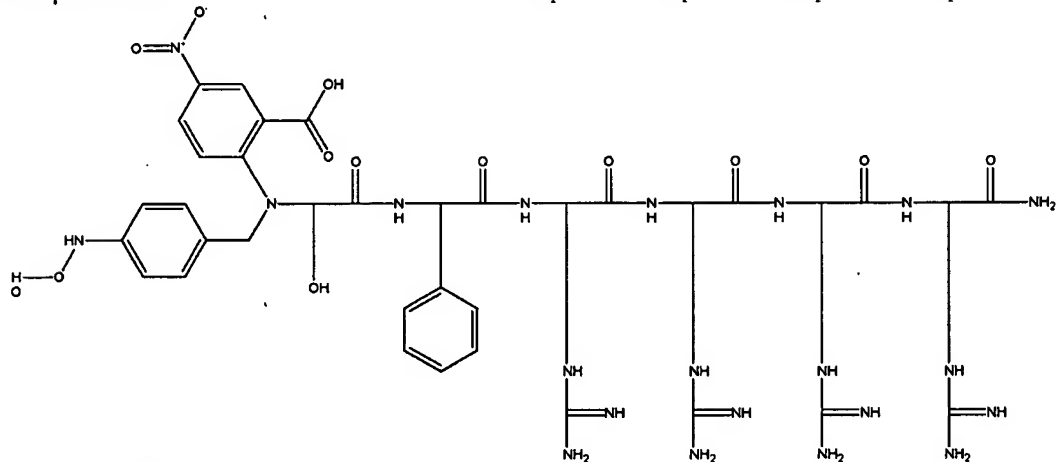


Compound 260

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Compound 261



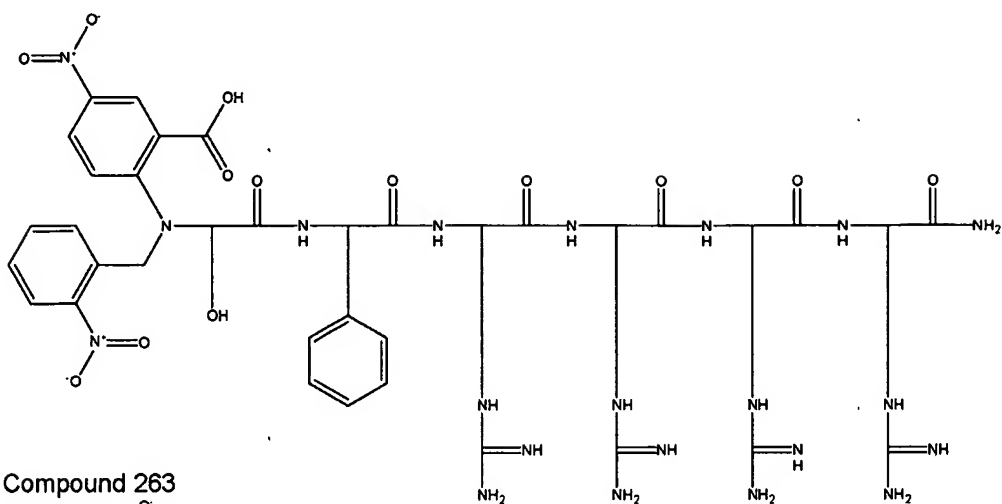
Compound 262

Applicant: David S. Lawrence

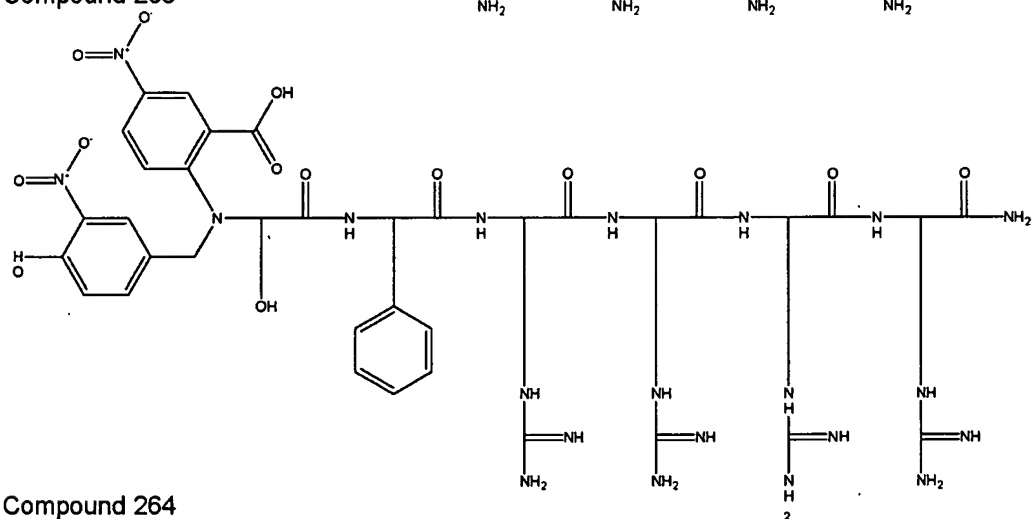
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Compound 263



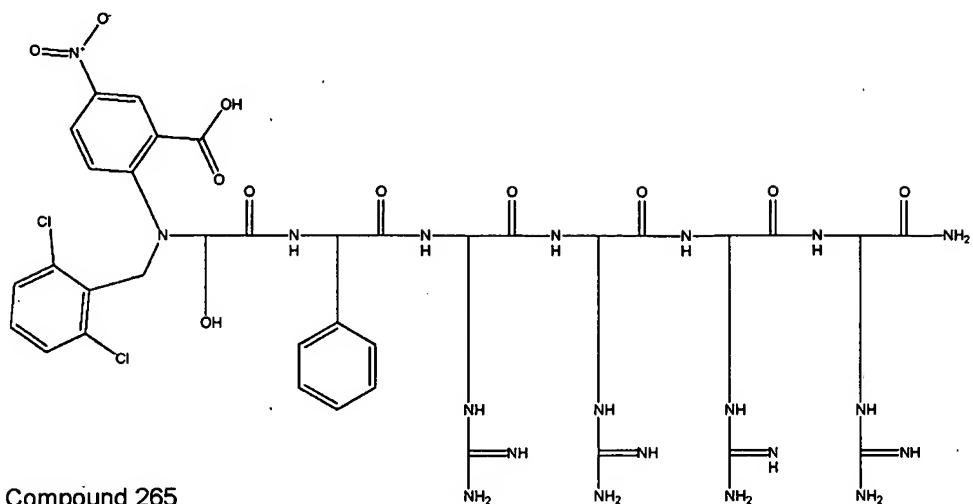
Compound 264

Applicant: David S. Lawrence

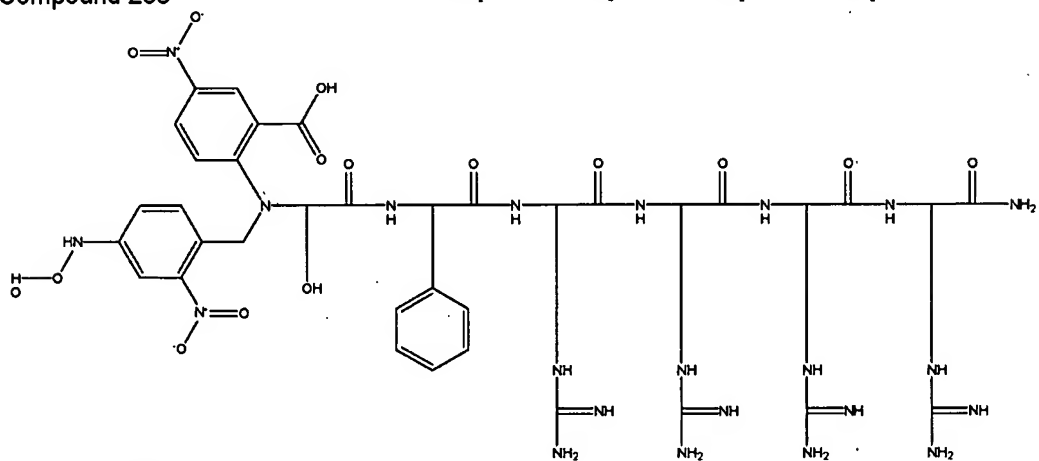
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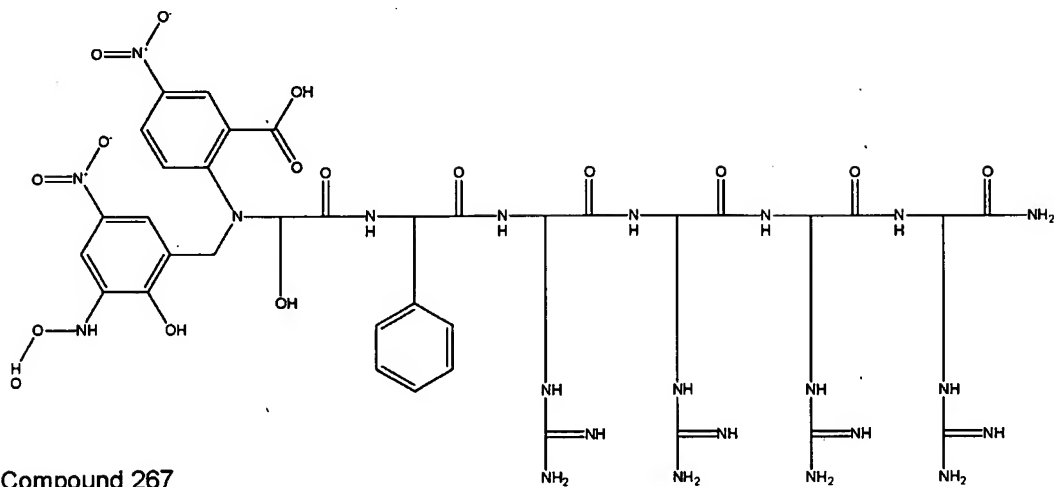


Compound 265

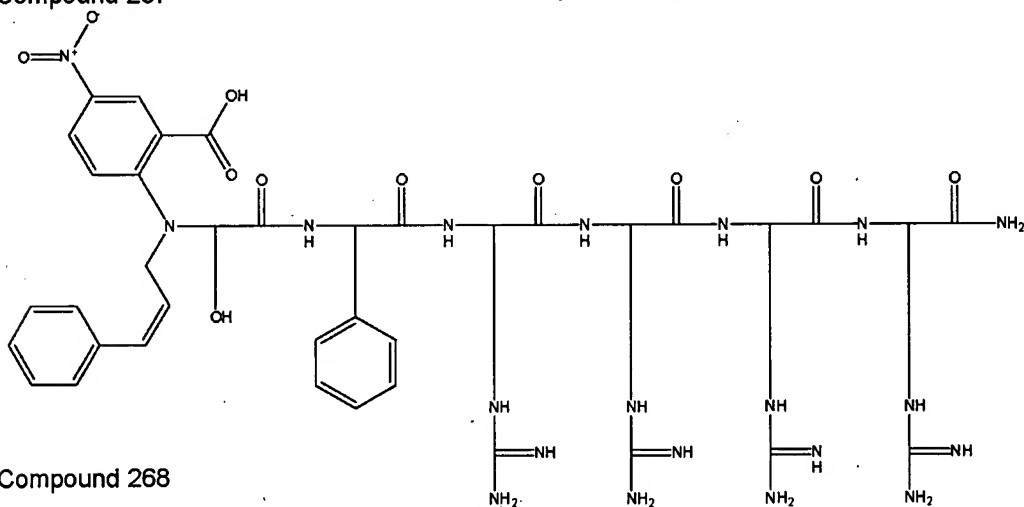


Compound 266

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Compound 267



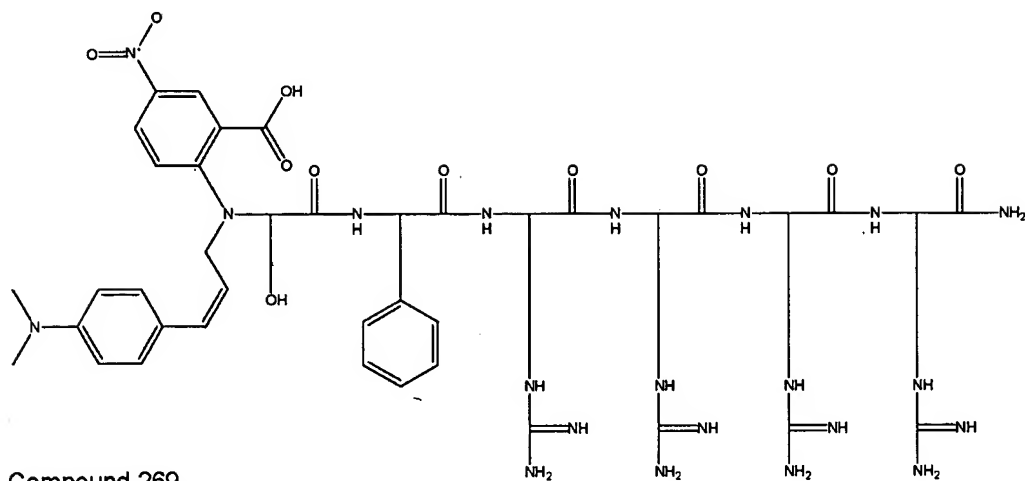
Compound 268

Applicant: David S. Lawrence

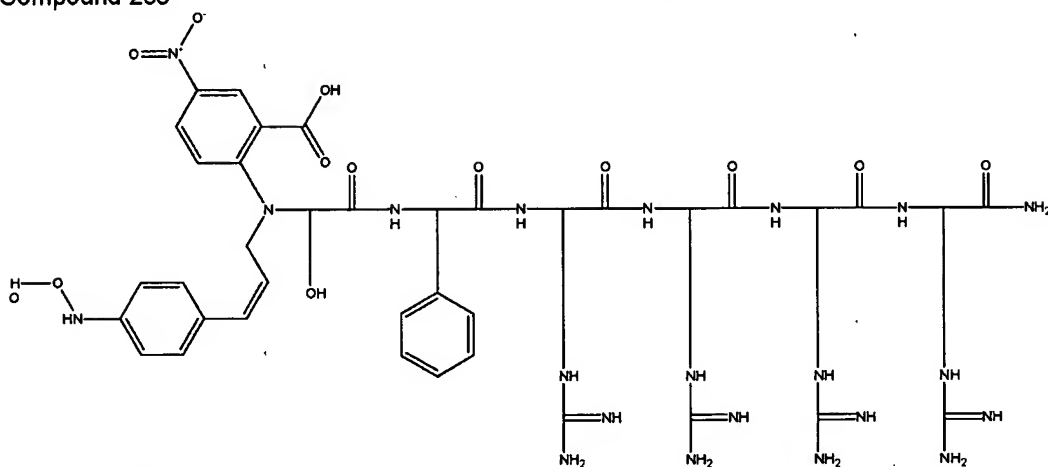
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Compound 269



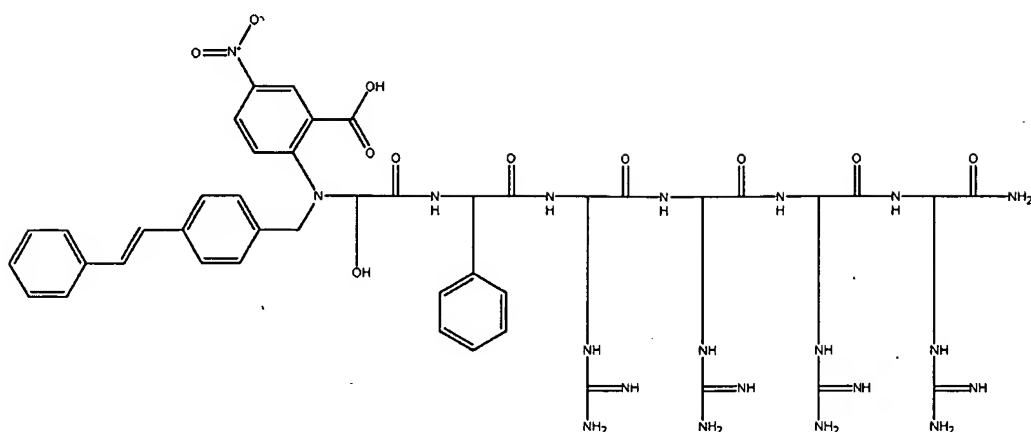
Compound 270

Applicant: David S. Lawrence

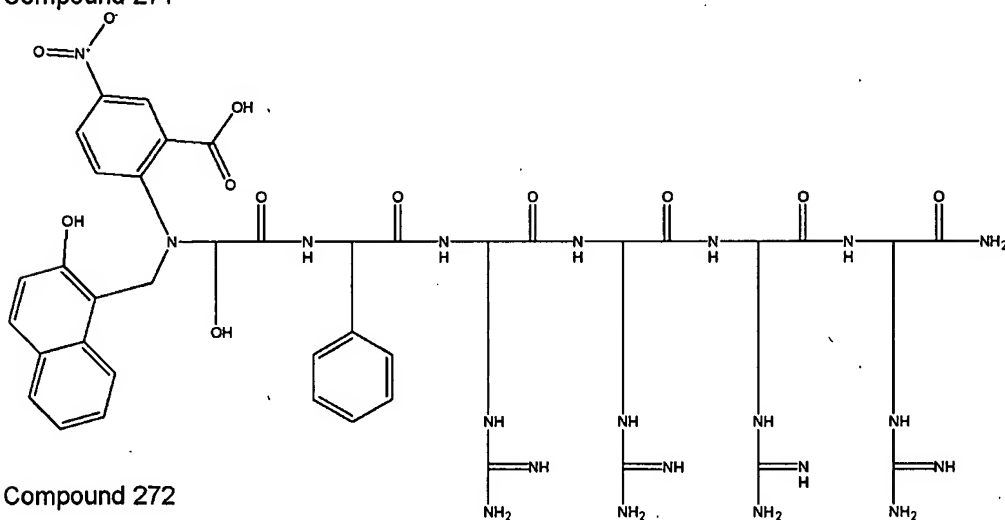
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Compound 271



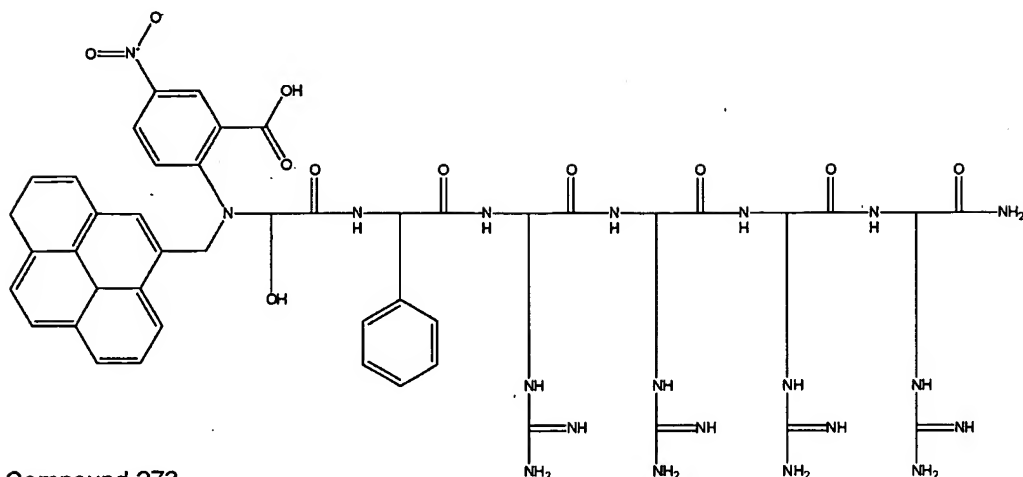
Compound 272

Applicant: David S. Lawrence

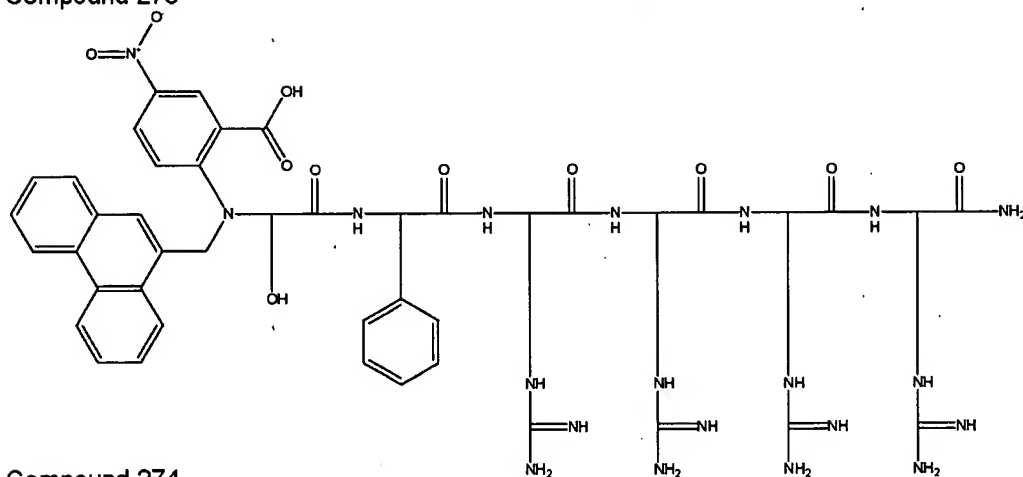
Serial No.: 10/755,086

Filed: January 9, 2004

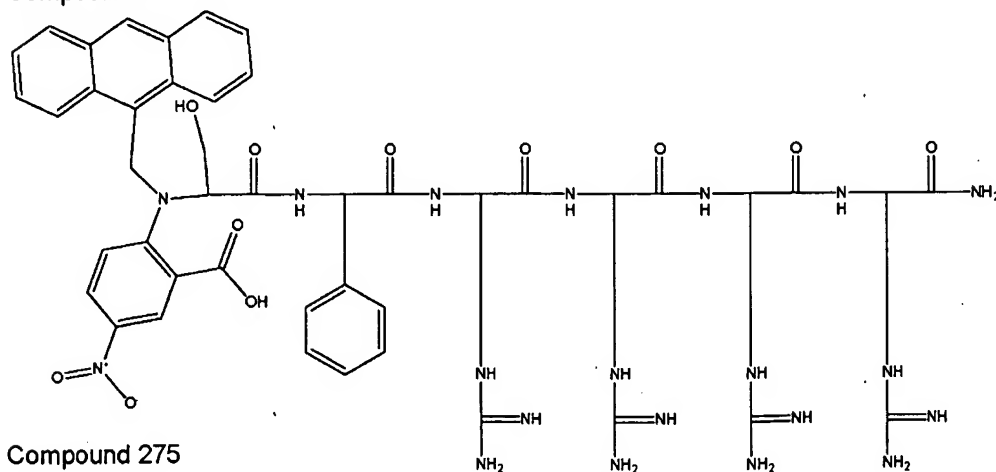
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Compound 273



Compound 274



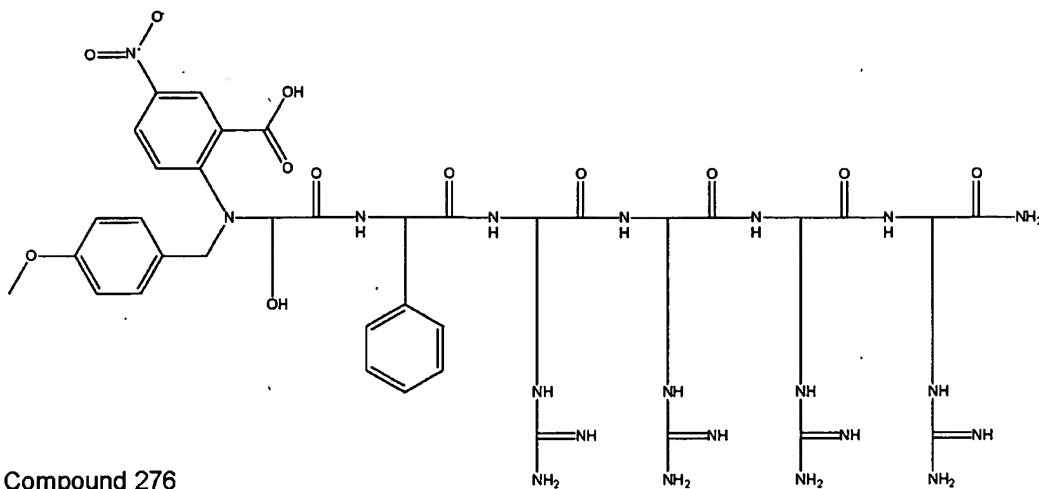
Compound 275

Applicant: David S. Lawrence

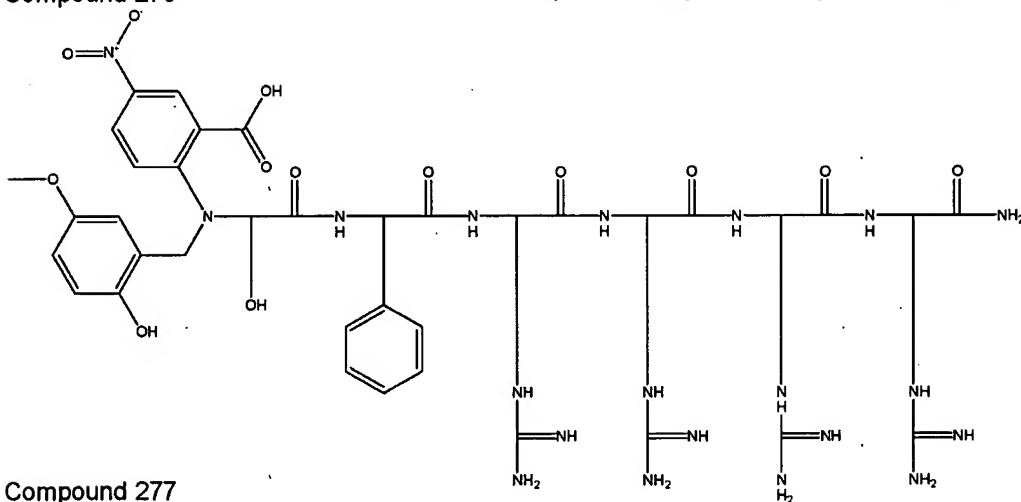
Serial No.: 10/755,086

Filed: January 9, 2004

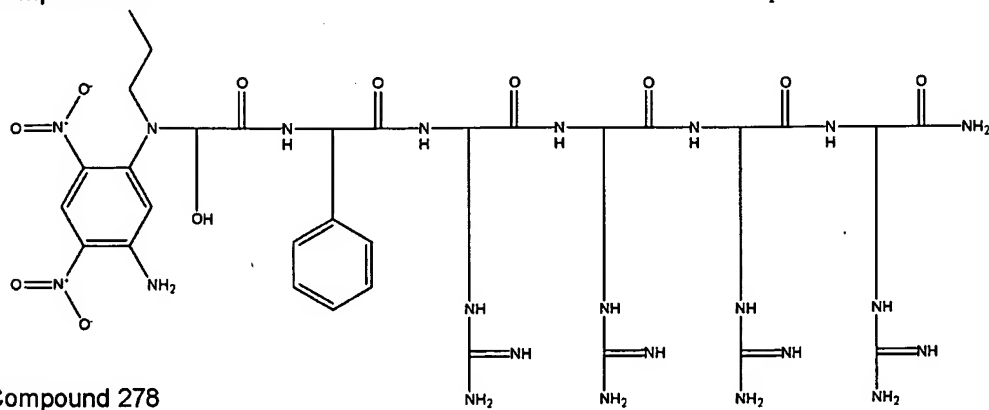
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Compound 276



Compound 277



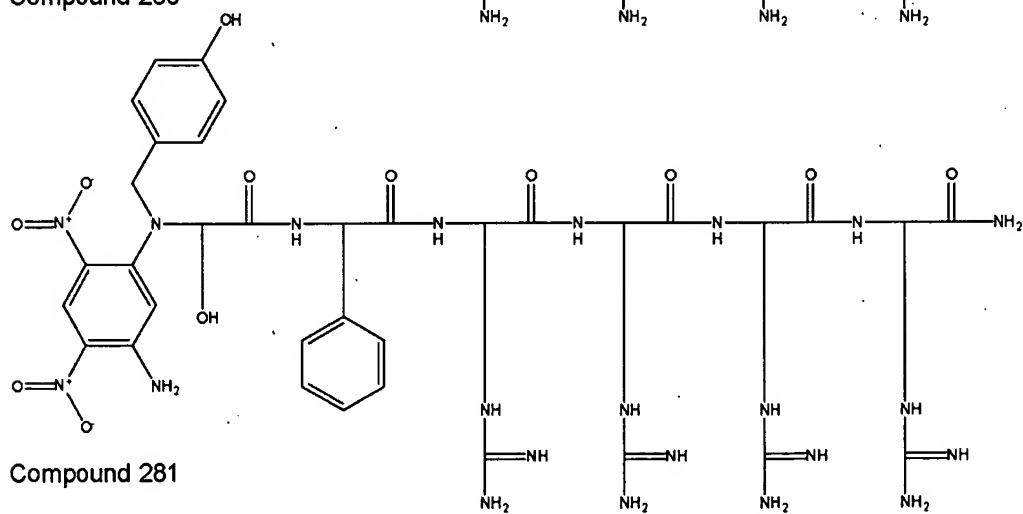
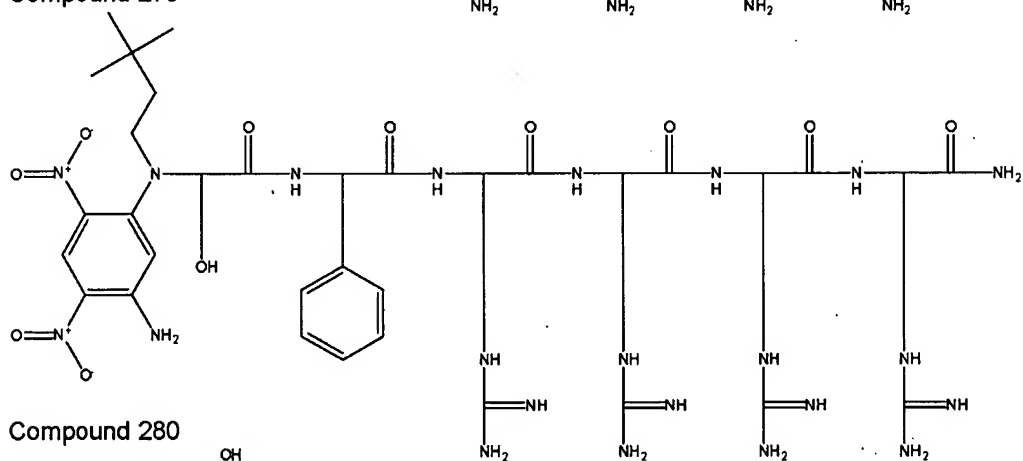
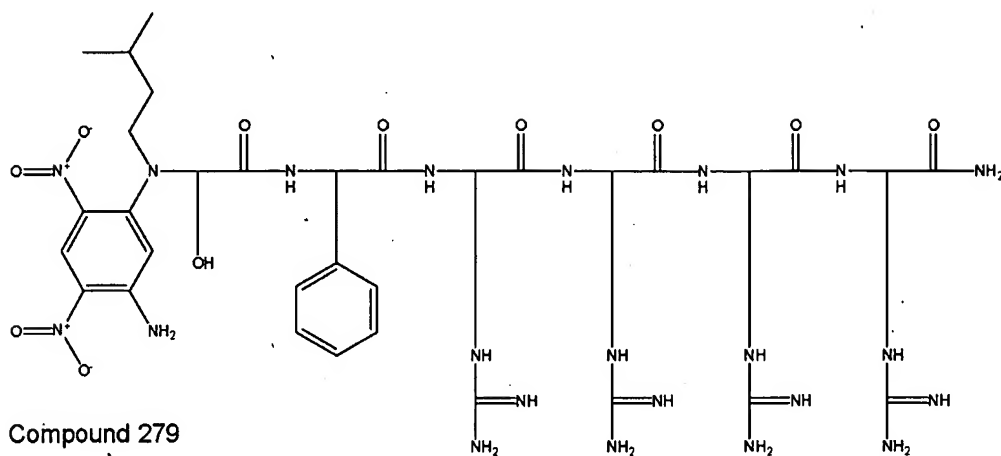
Compound 278

Applicant: David S. Lawrence

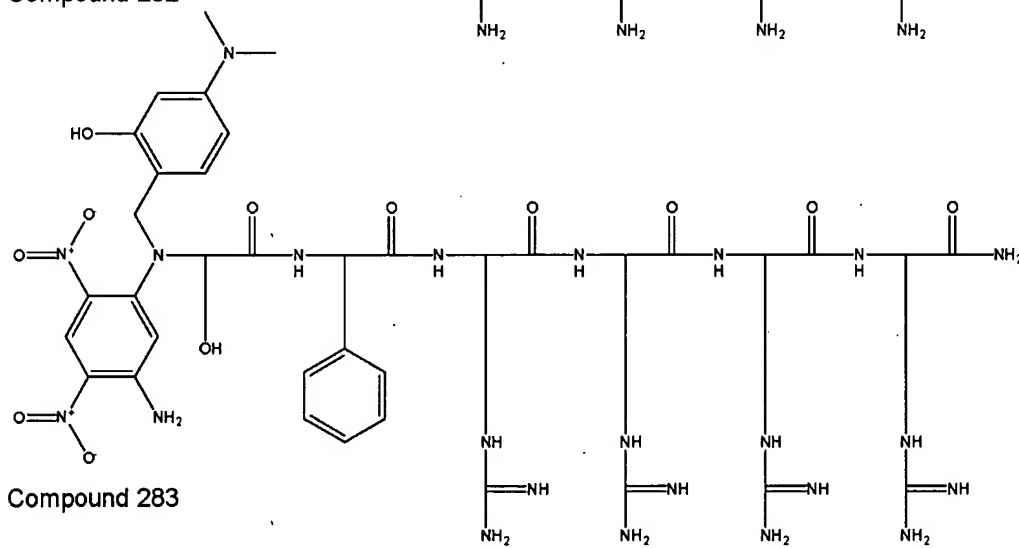
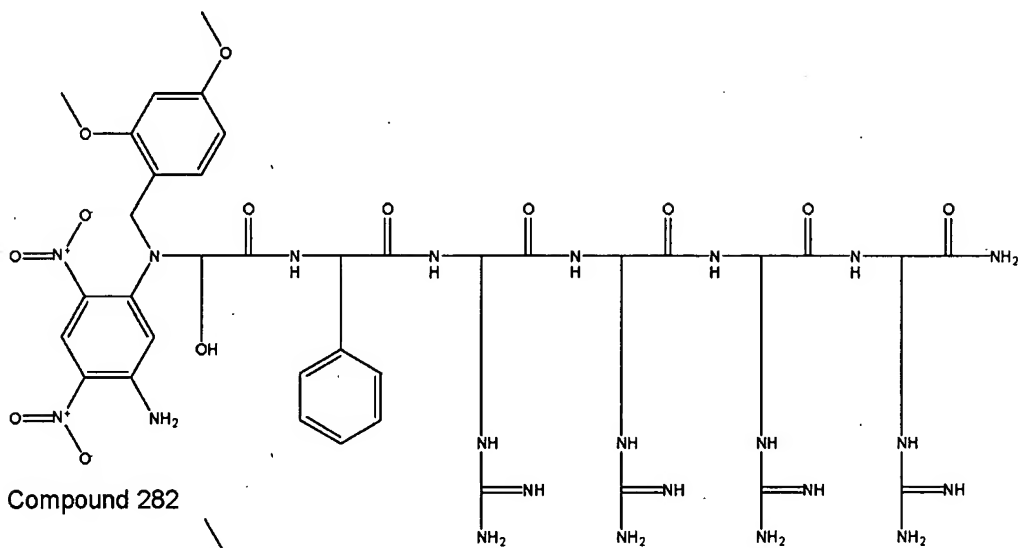
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Applicant: David S. Lawrence
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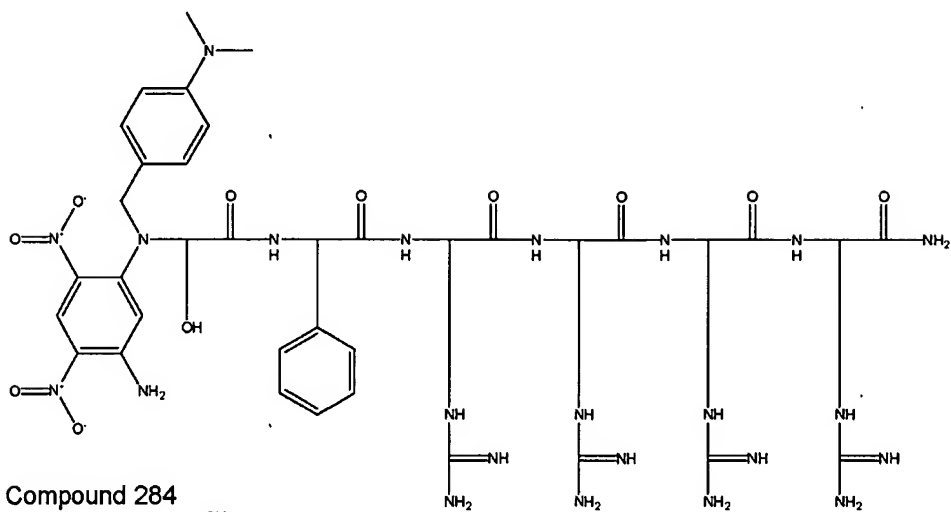


Applicant: David S. Lawrence

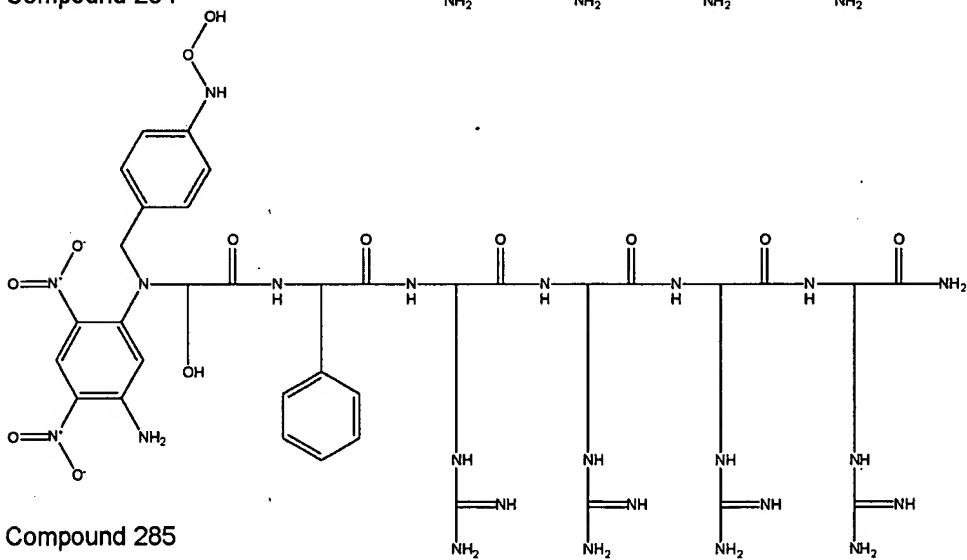
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Compound 284



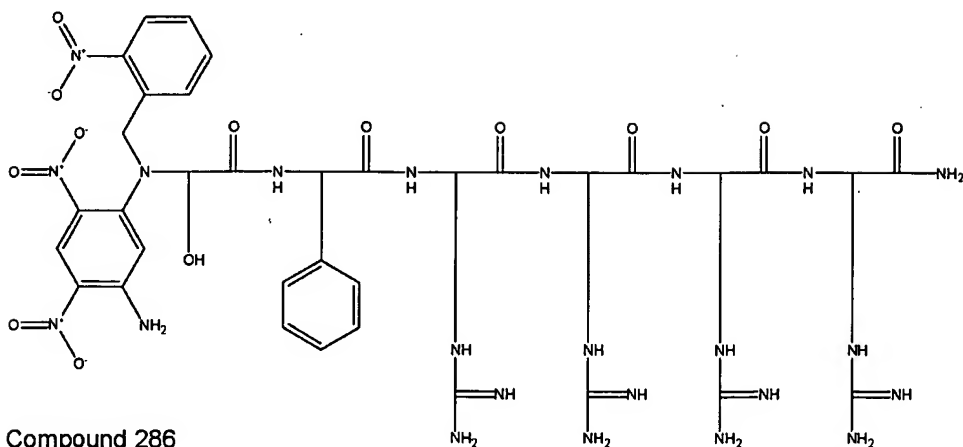
Compound 285

Applicant: David S. Lawrence

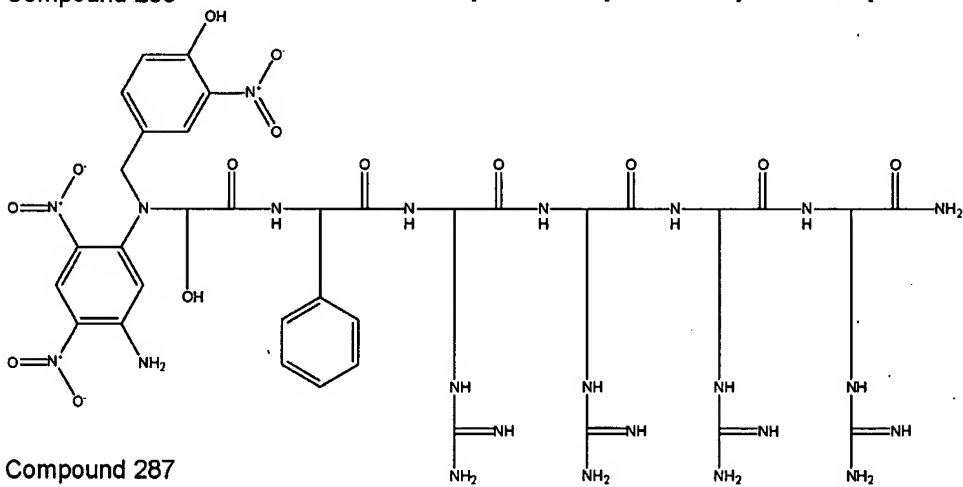
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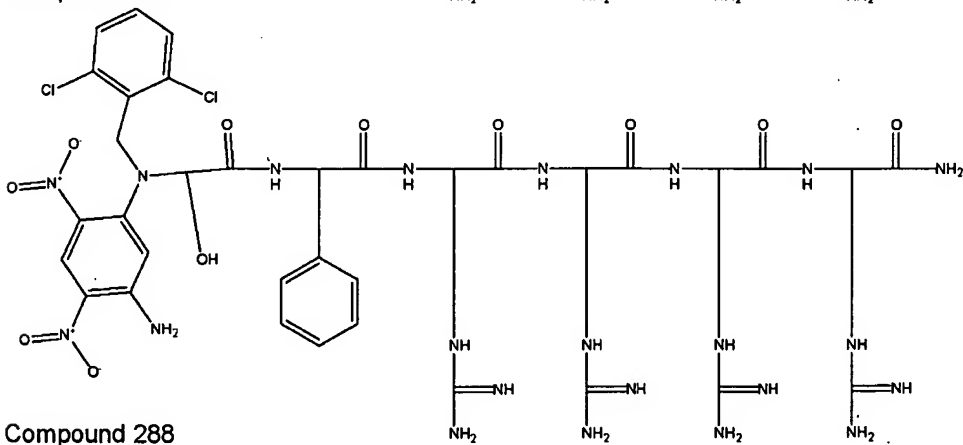
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Compound 286



Compound 287



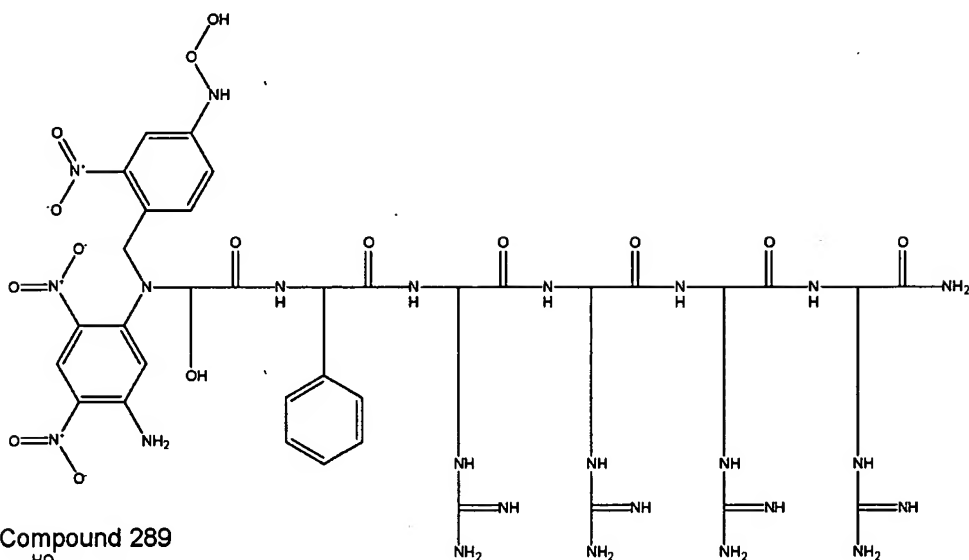
Compound 288

Applicant: David S. Lawrence

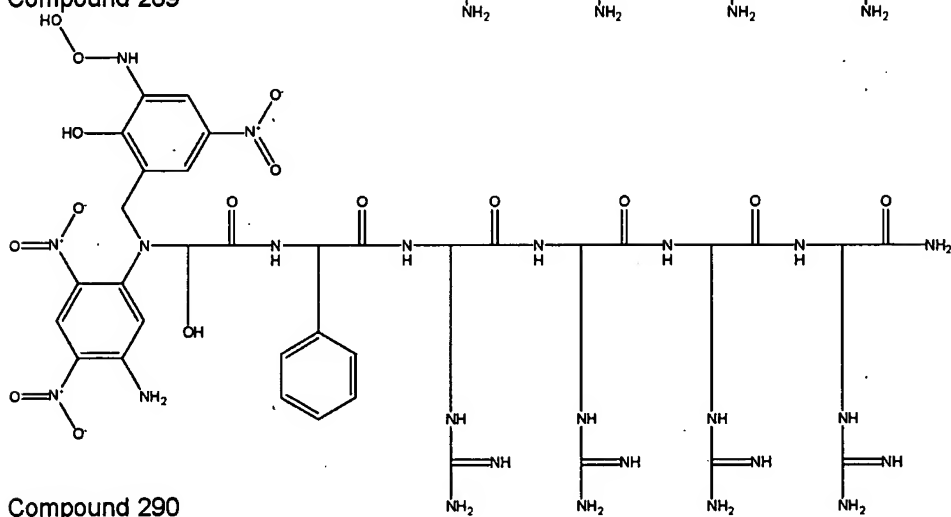
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Compound 289



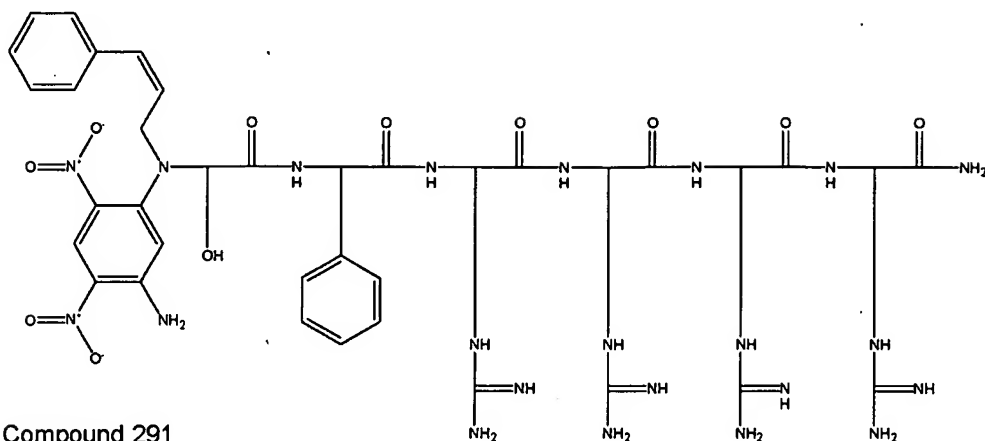
Compound 290

Applicant: David S. Lawrence

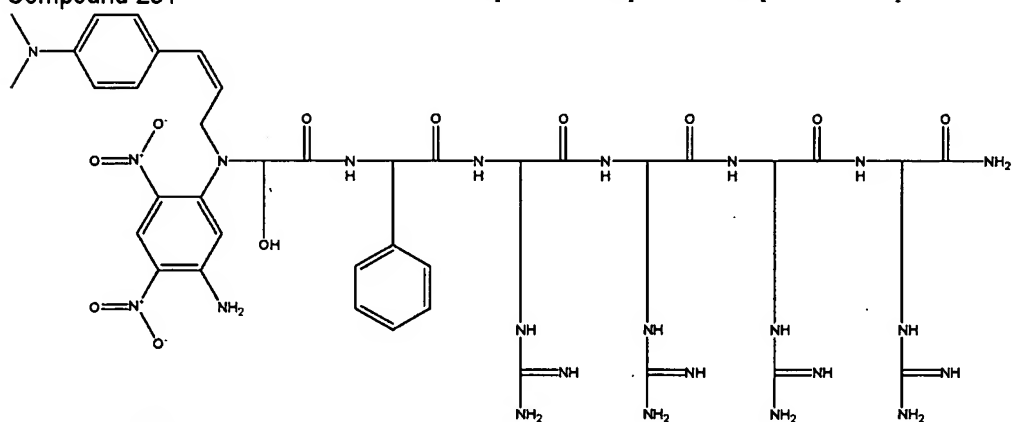
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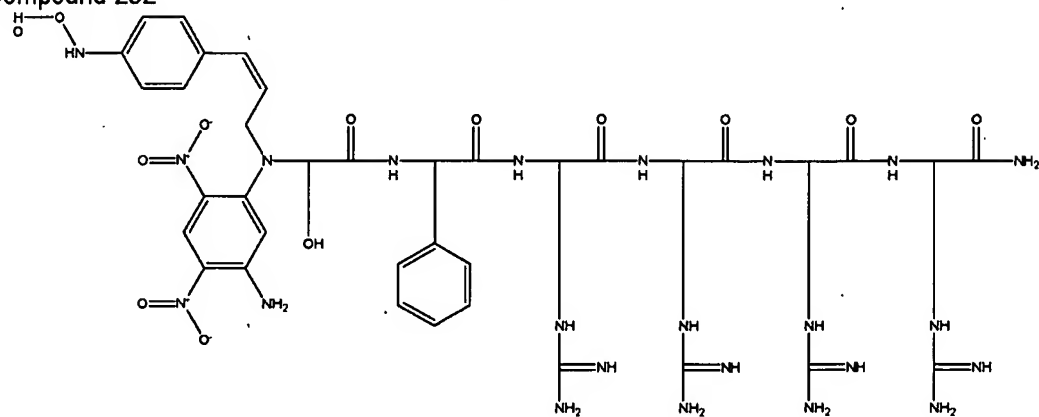
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Compound 291



Compound 292



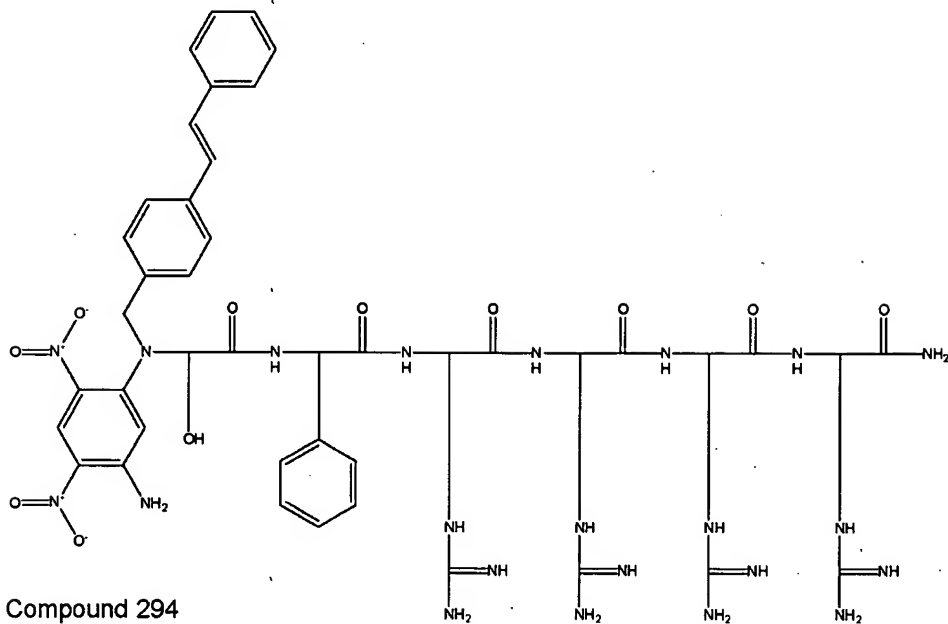
Compound 293

Applicant: David S. Lawrence

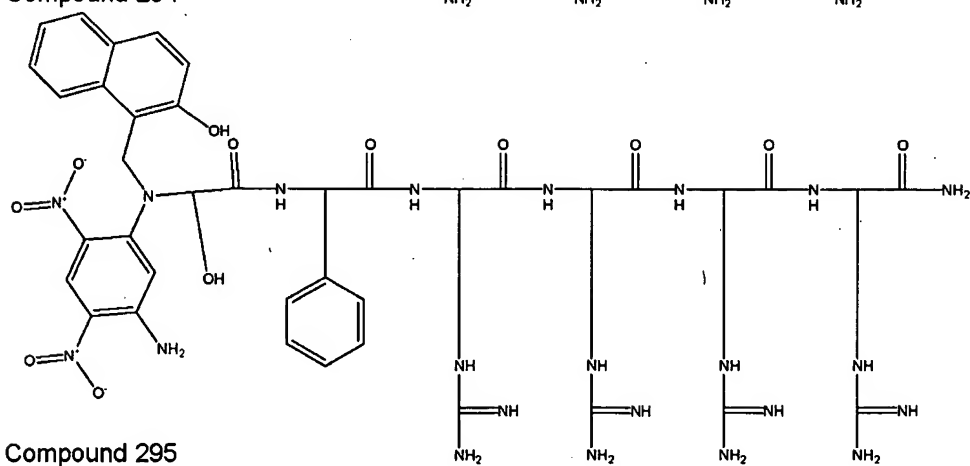
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Compound 294



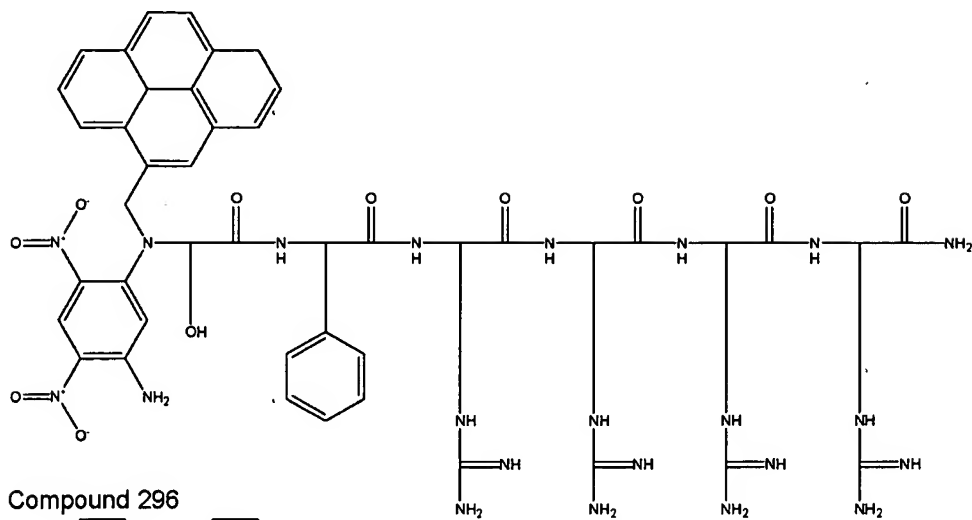
Compound 295

Applicant: David S. Lawrence

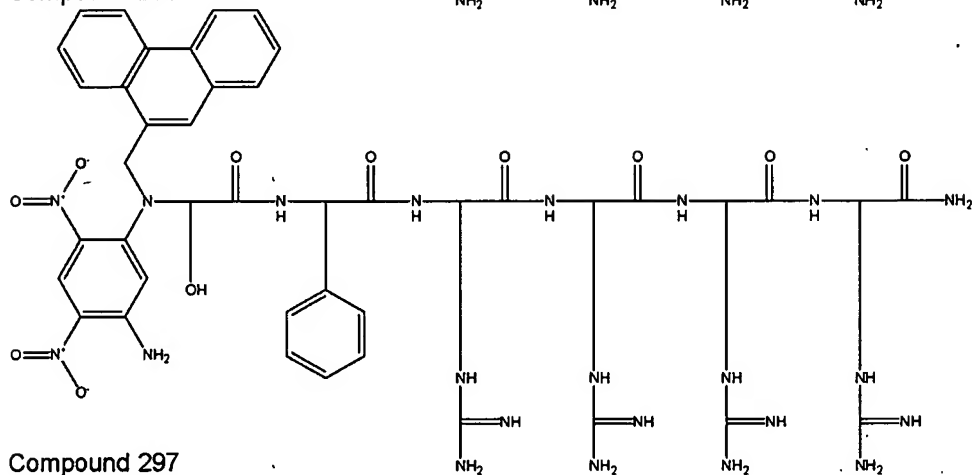
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Compound 296



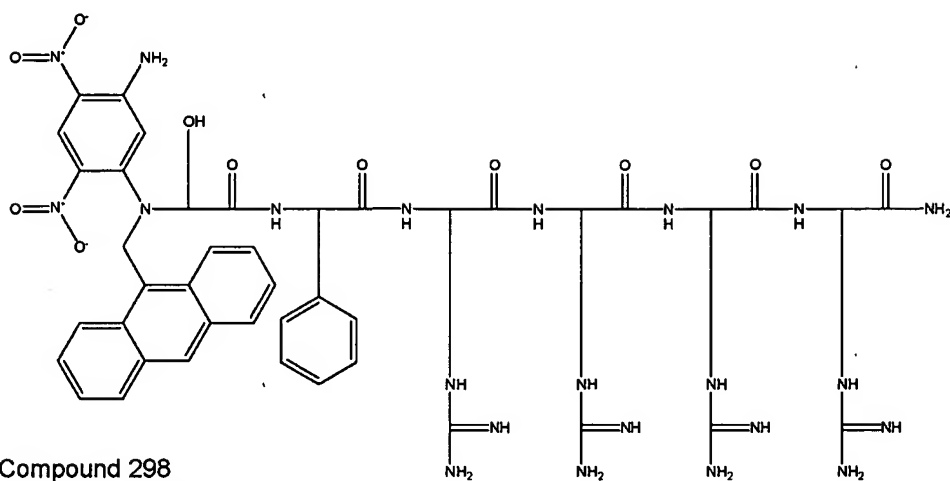
Compound 297

Applicant: David S. Lawrence

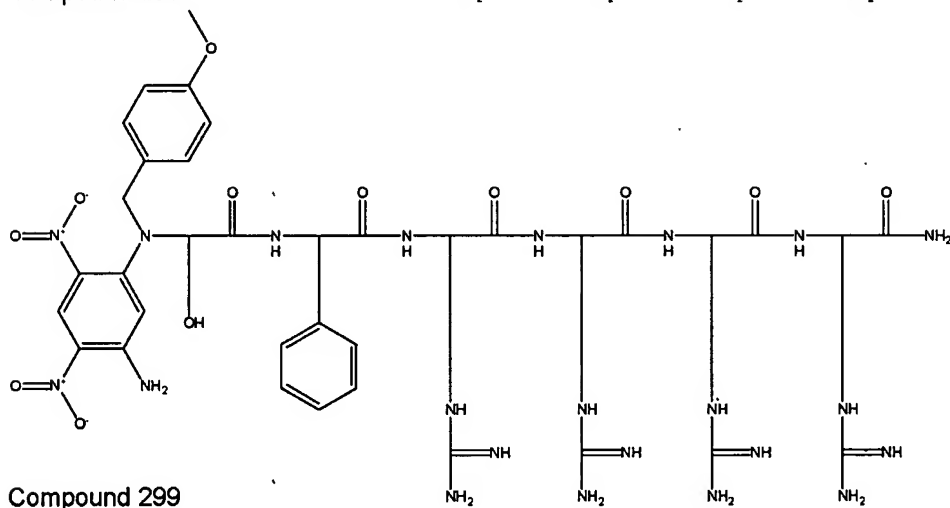
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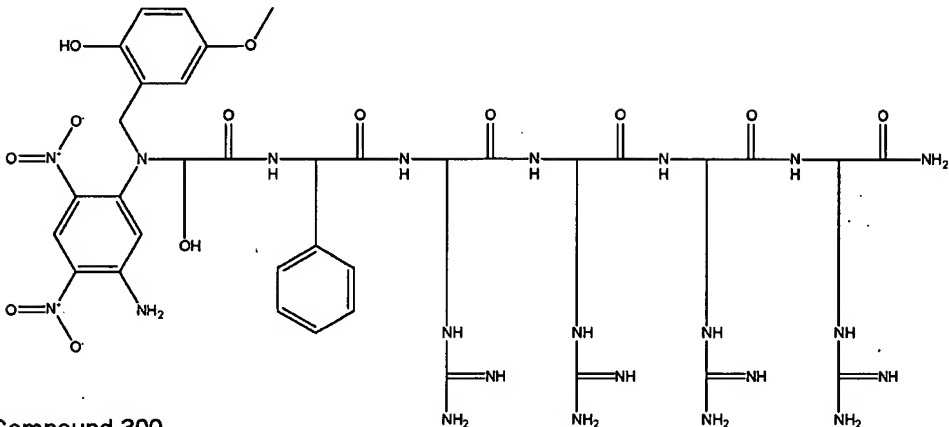


Compound 298

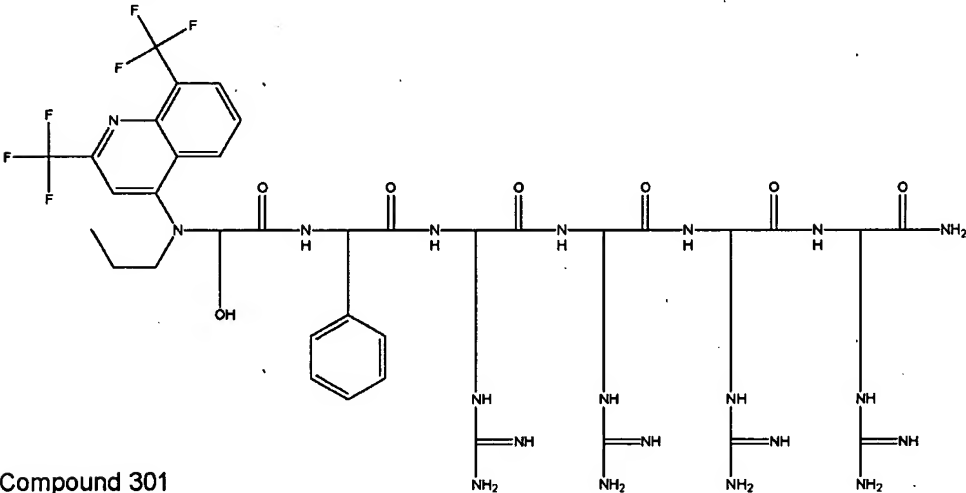


Compound 299

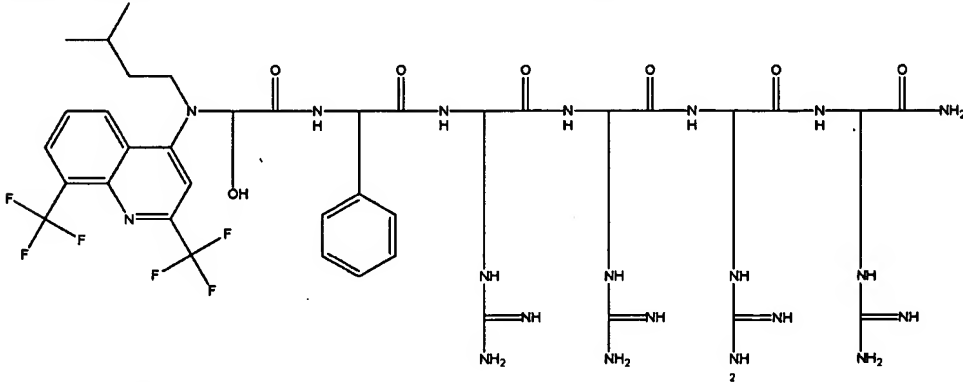
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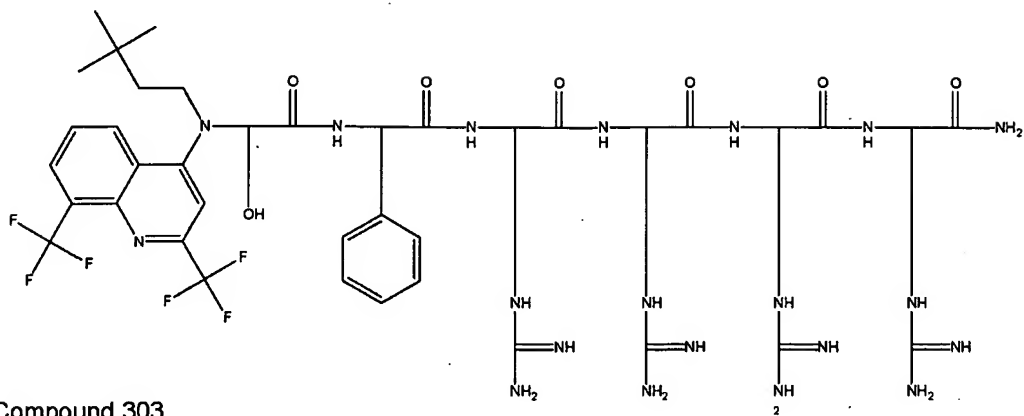
Compound 300



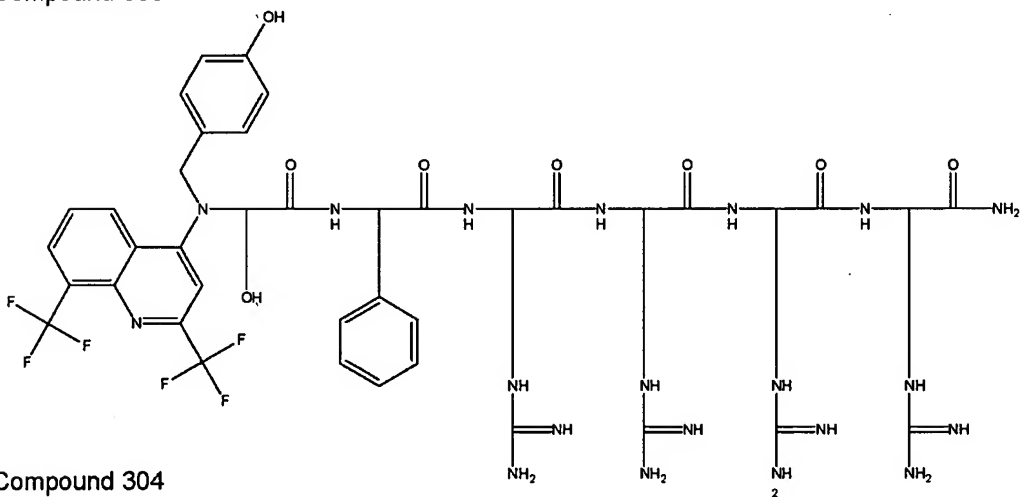
Compound 301



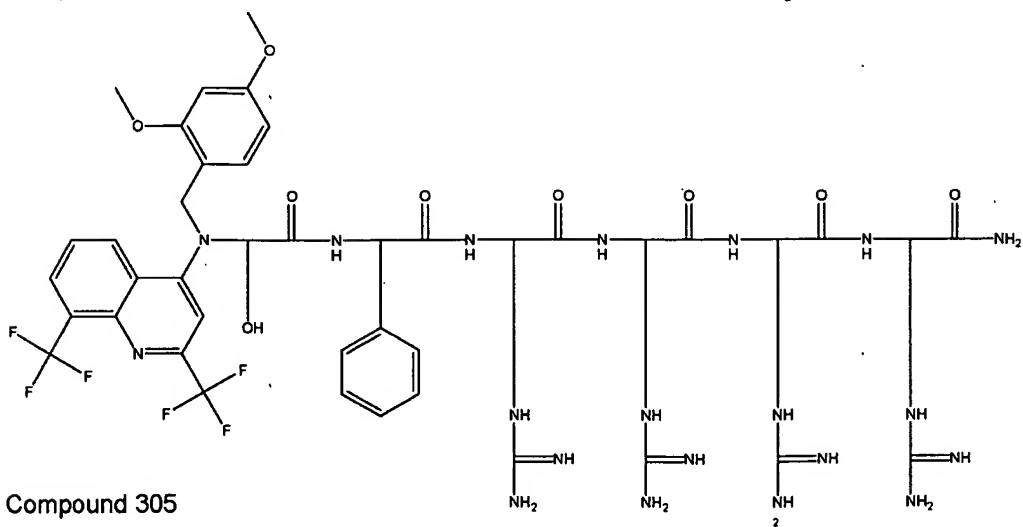
Compound 302



Compound 303



Compound 304



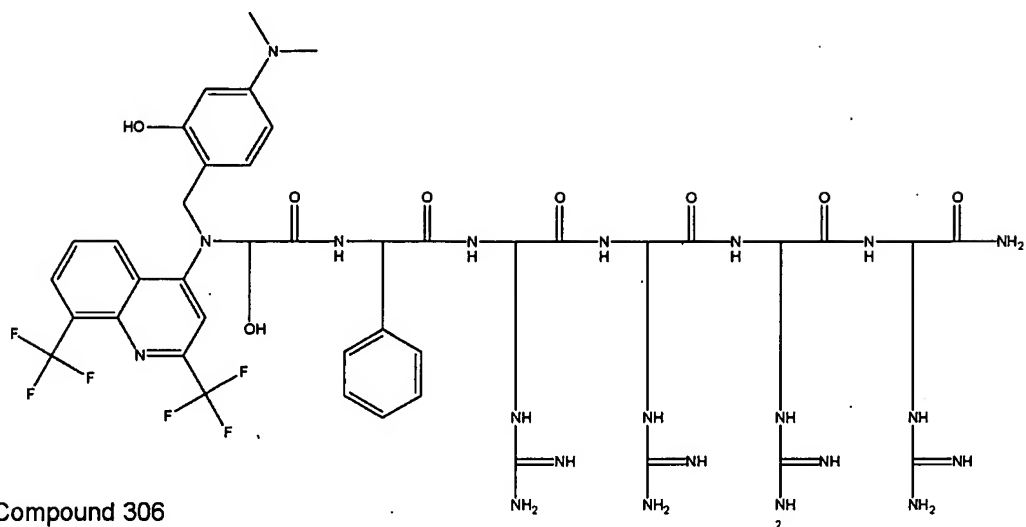
Compound 305

Applicant: David S. Lawrence

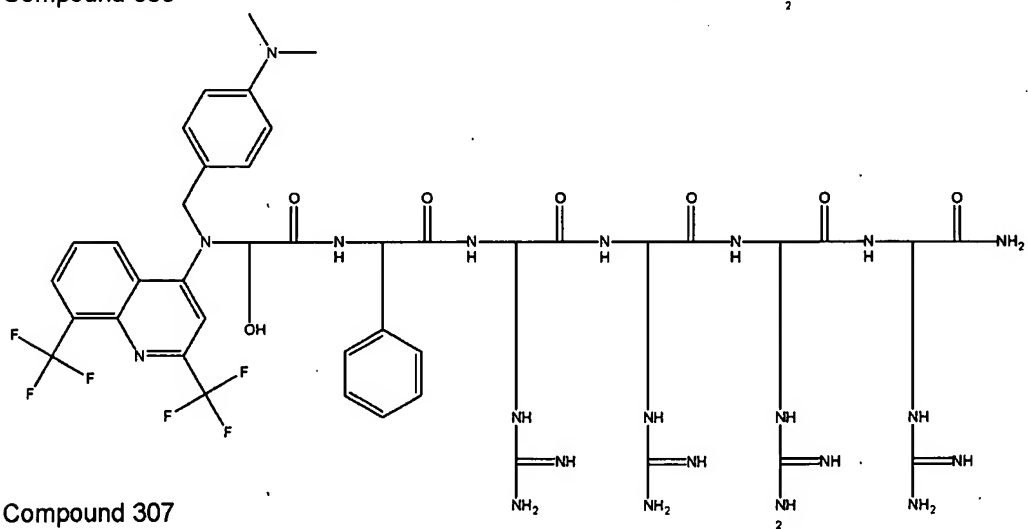
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Compound 306



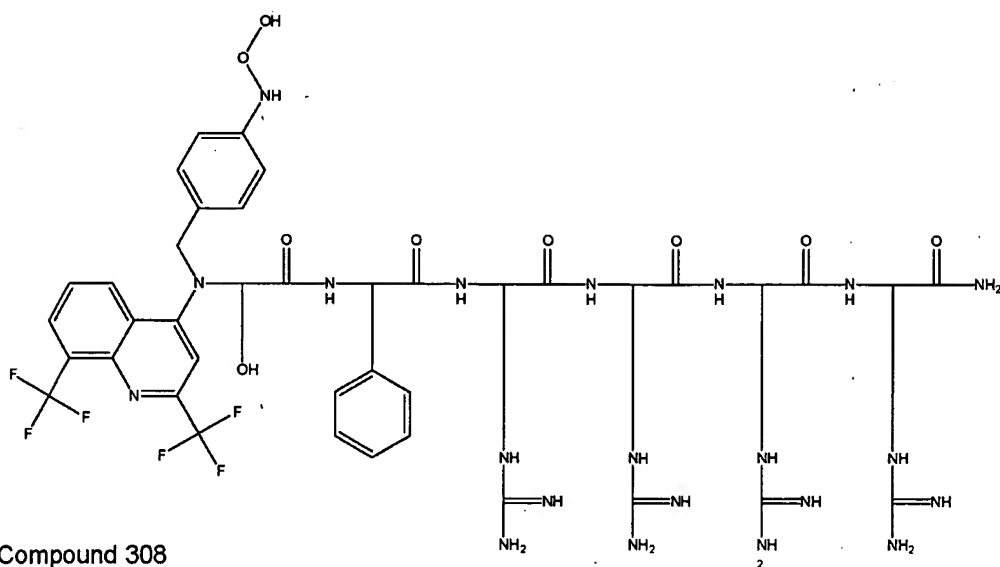
Compound 307

Applicant: David S. Lawrence

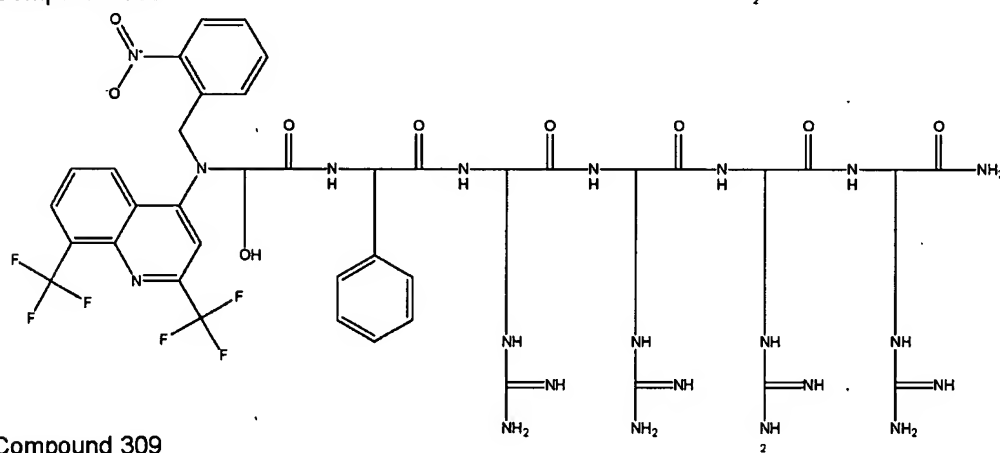
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Compound 308



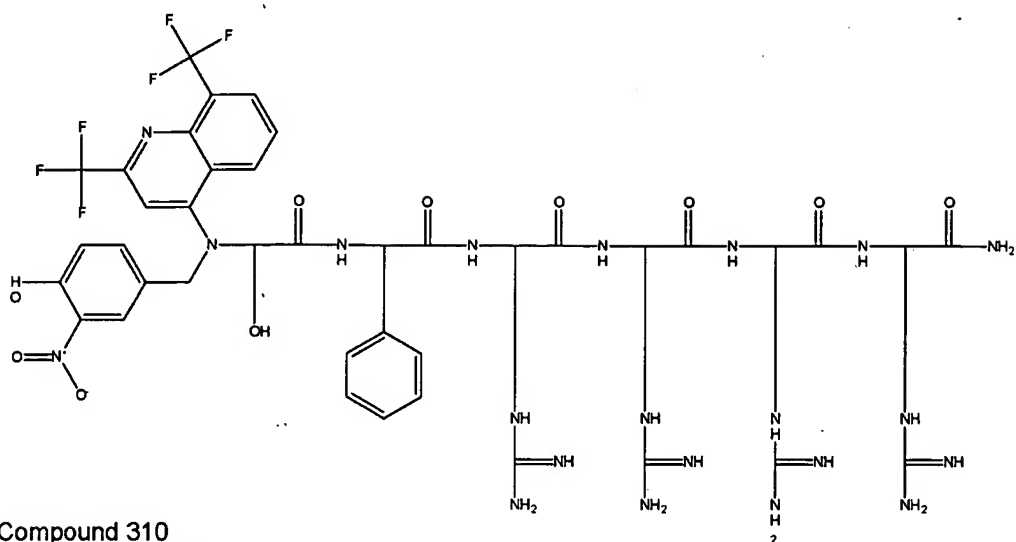
Compound 309

Applicant: David S. Lawrence

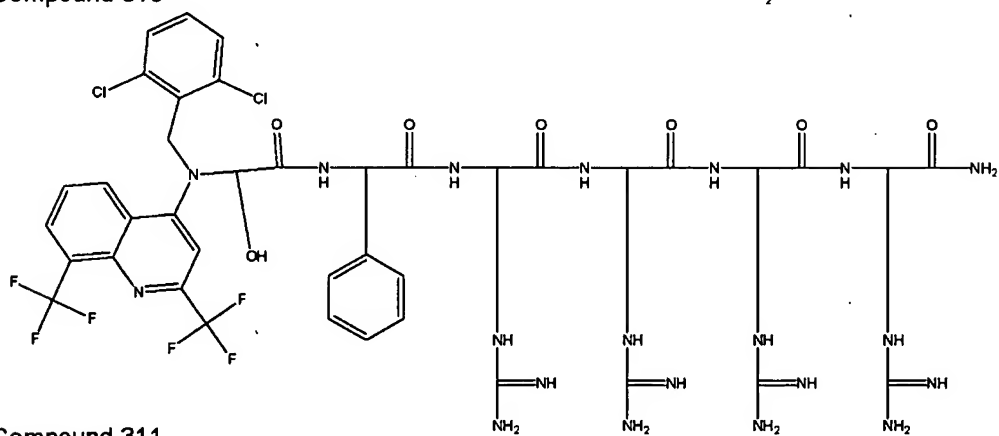
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Compound 310



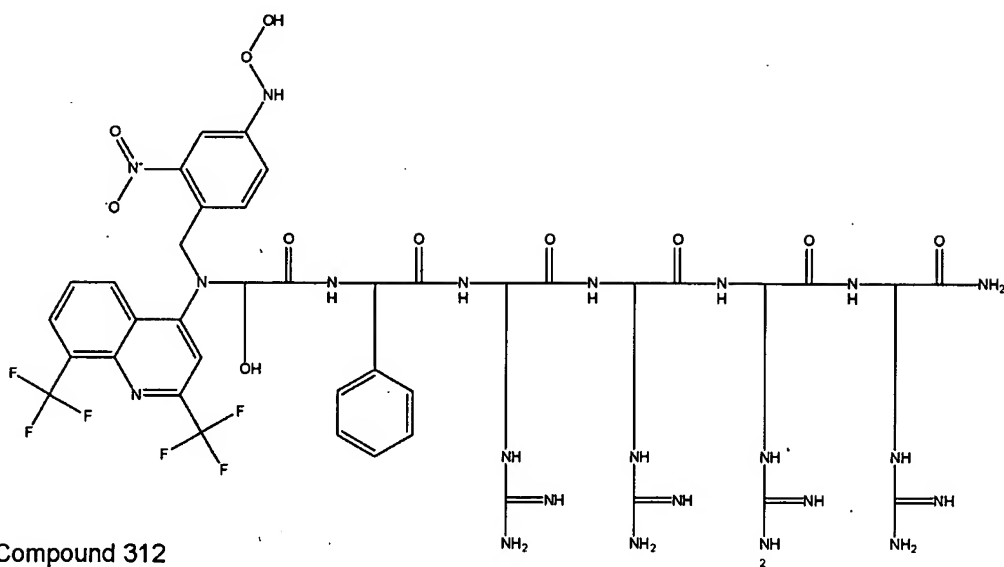
Compound 311

Applicant: David S. Lawrence

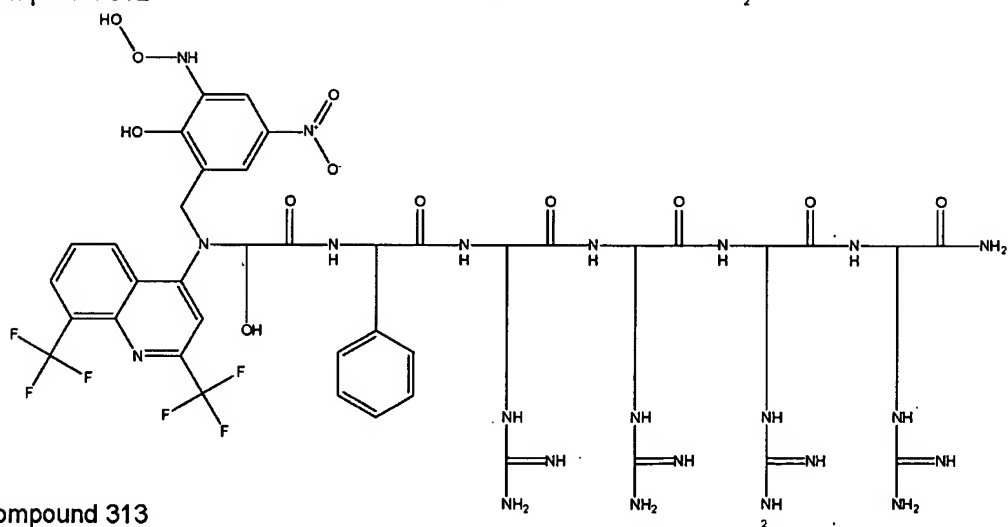
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Compound 312



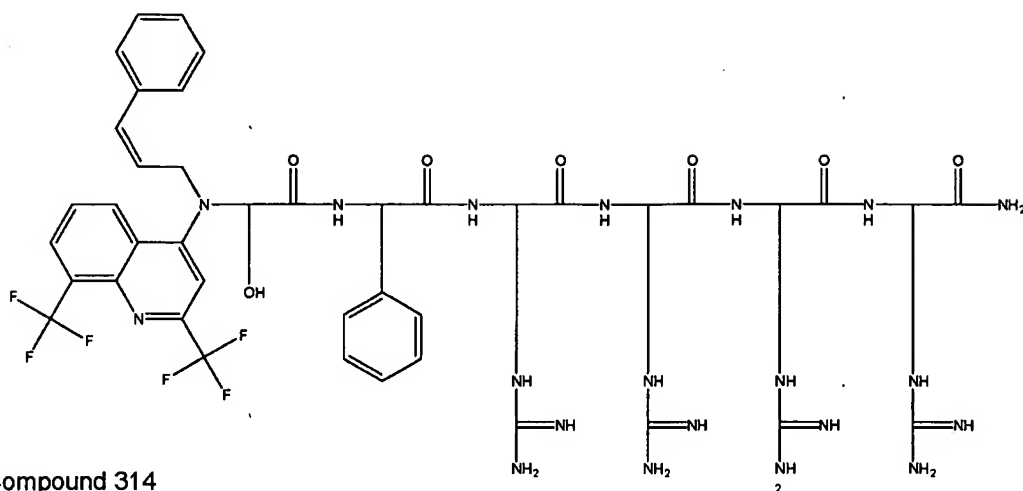
Compound 313

Applicant: David S. Lawrence

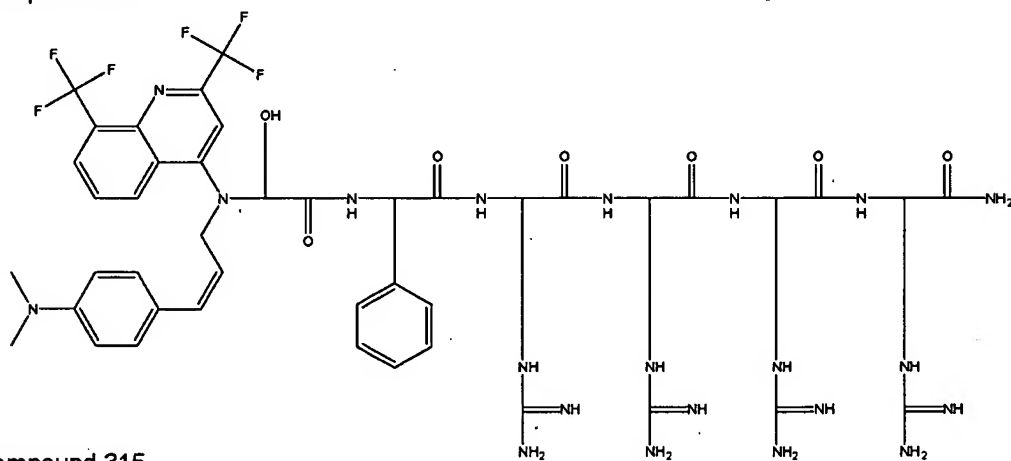
Serial No.: 10/755,086

Filed: January 9, 2004

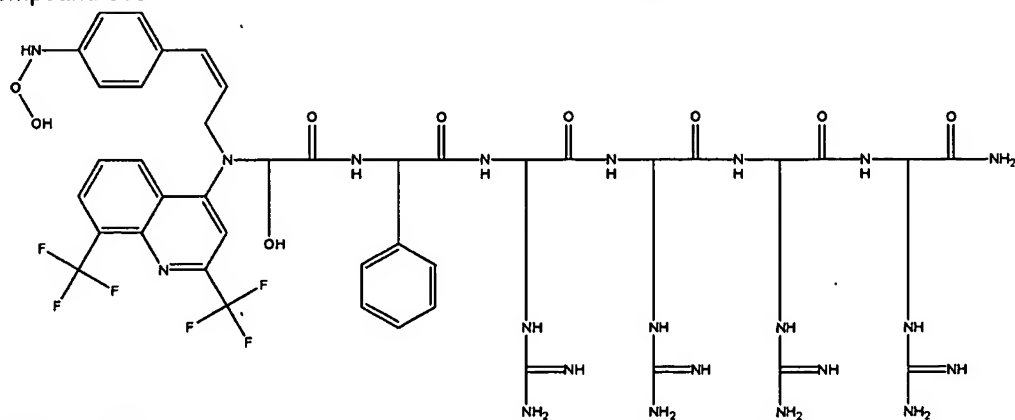
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Compound 314

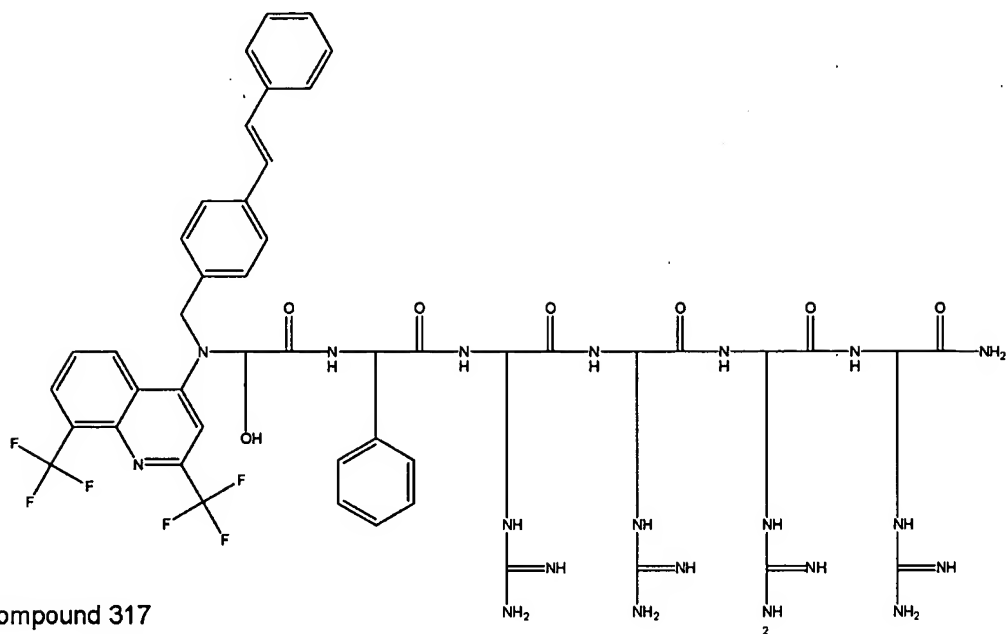


Compound 315

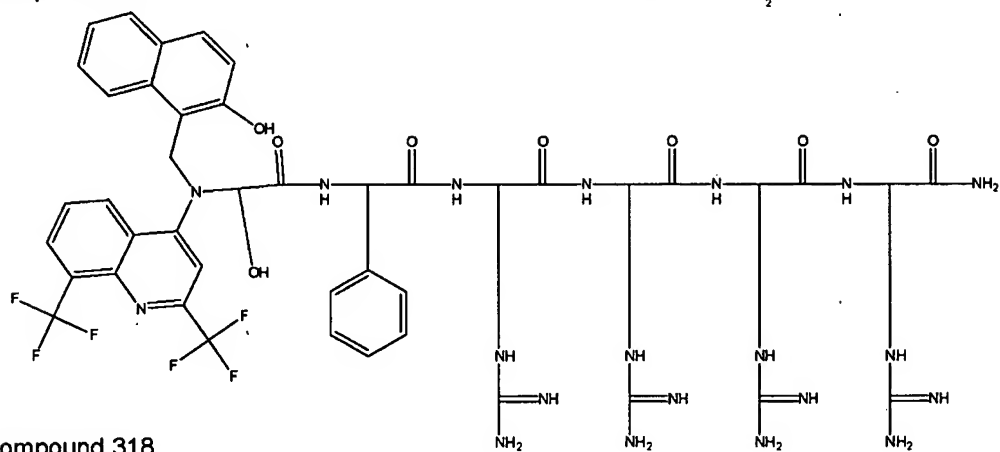


Compound 316

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Compound 317



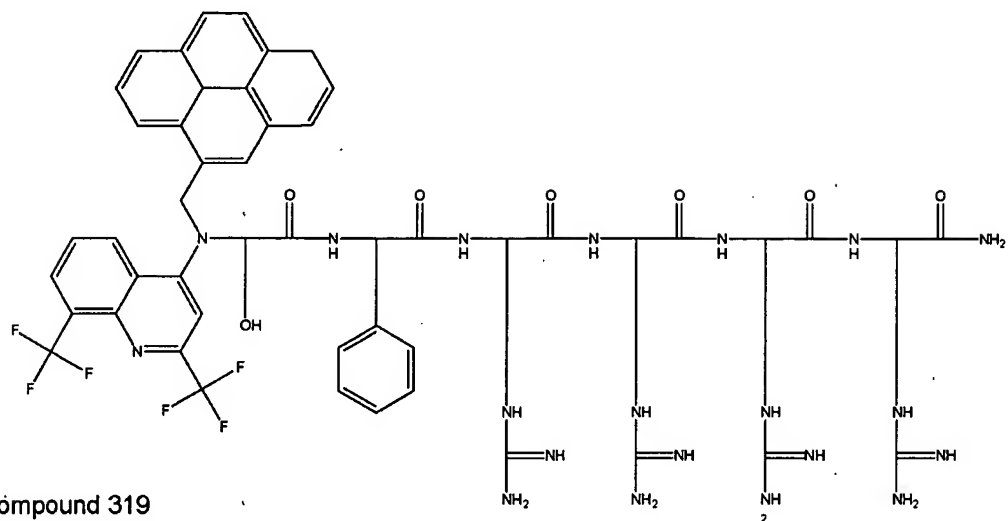
Compound 318

Applicant: David S. Lawrence

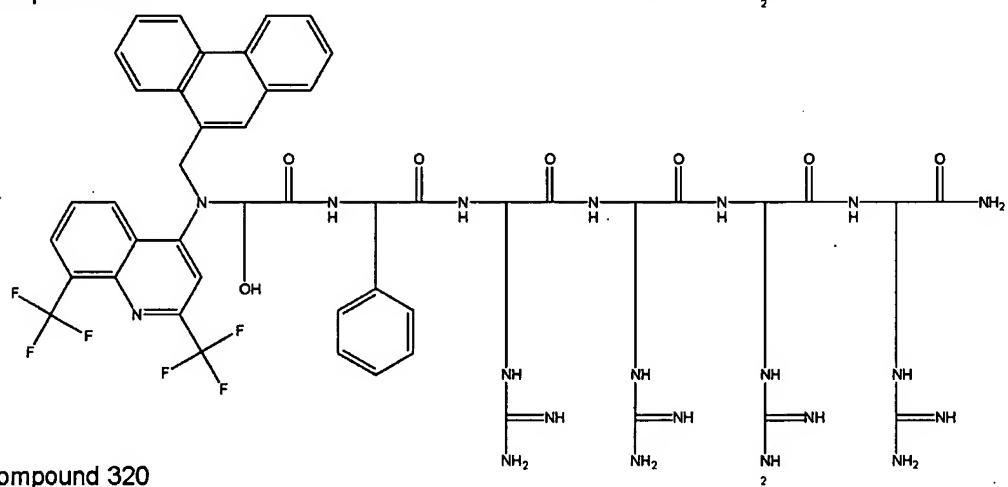
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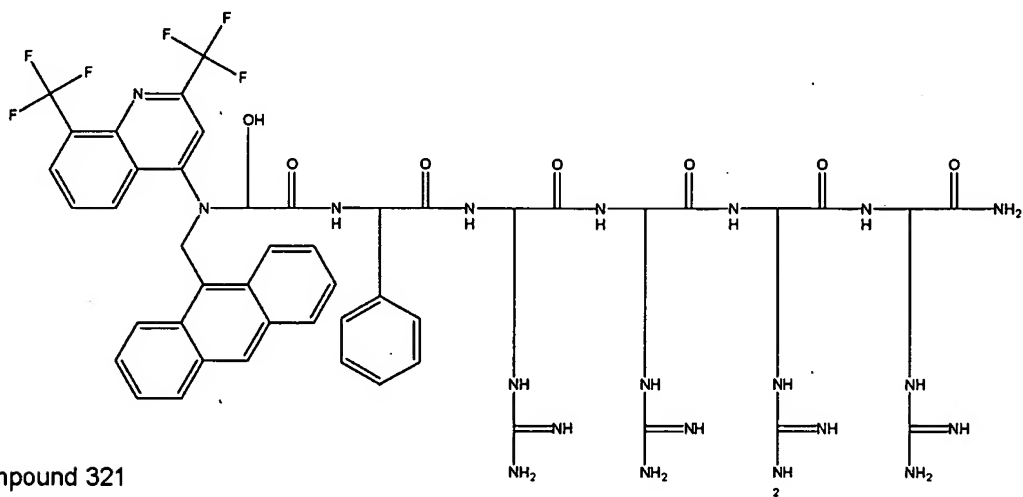


Compound 319

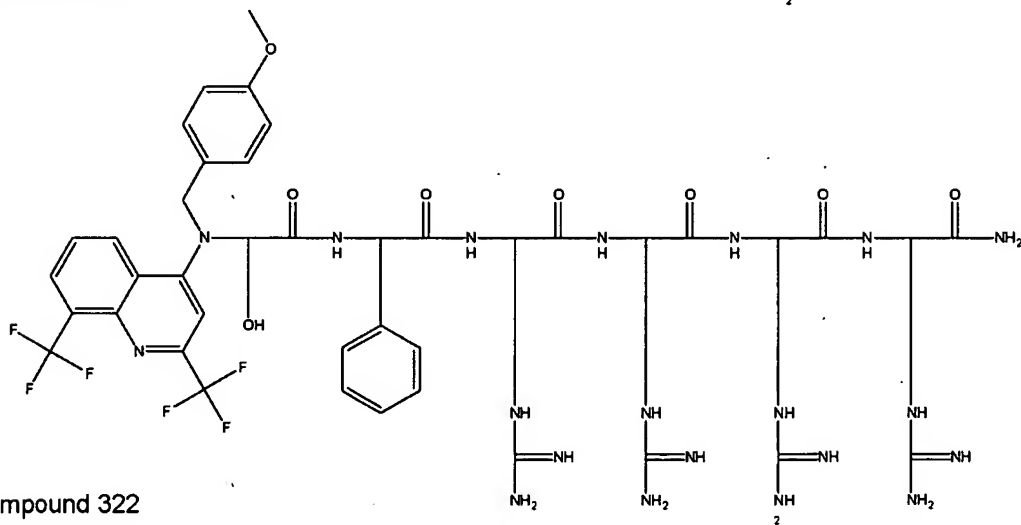


Compound 320

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Compound 321



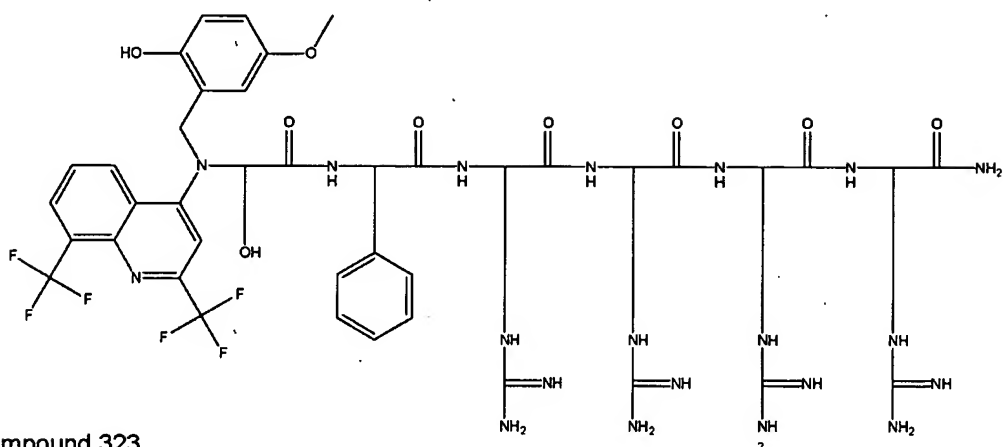
Compound 322

Applicant: David S. Lawrence

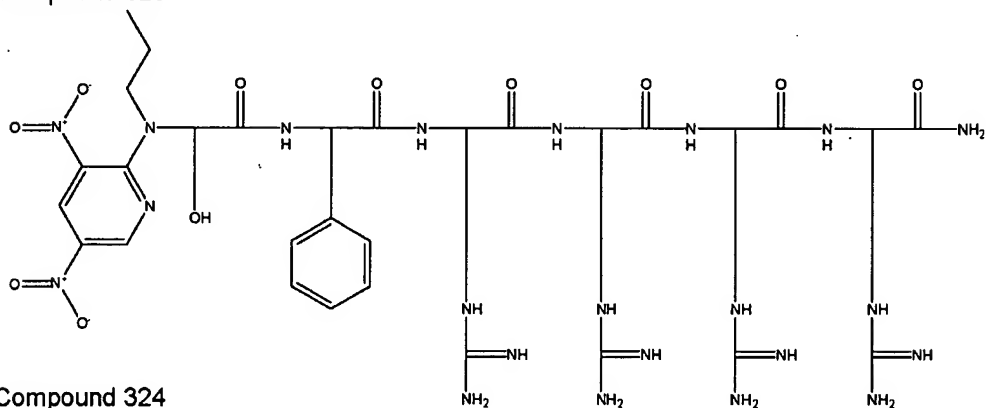
Serial No.: 10/755,086

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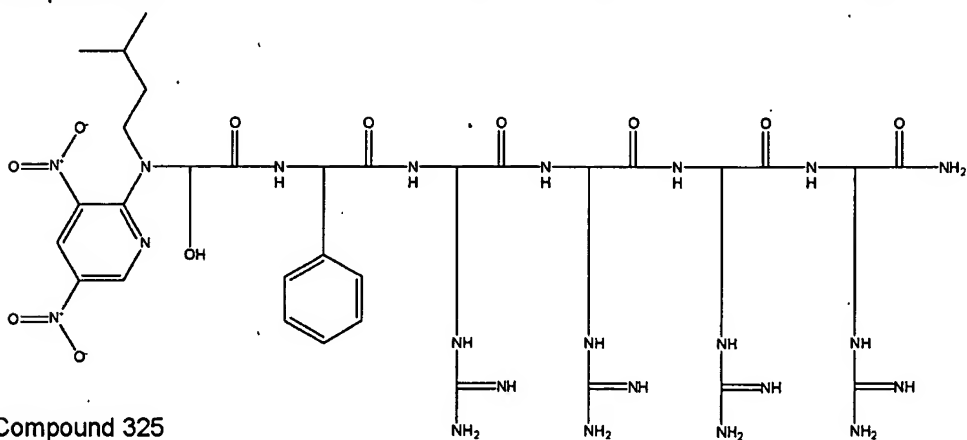
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Compound 323



Compound 324



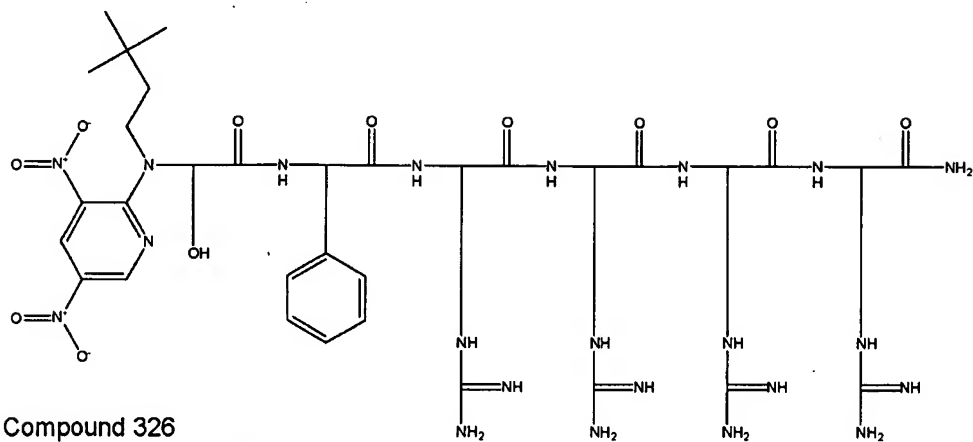
Compound 325

Applicant: David S. Lawrence

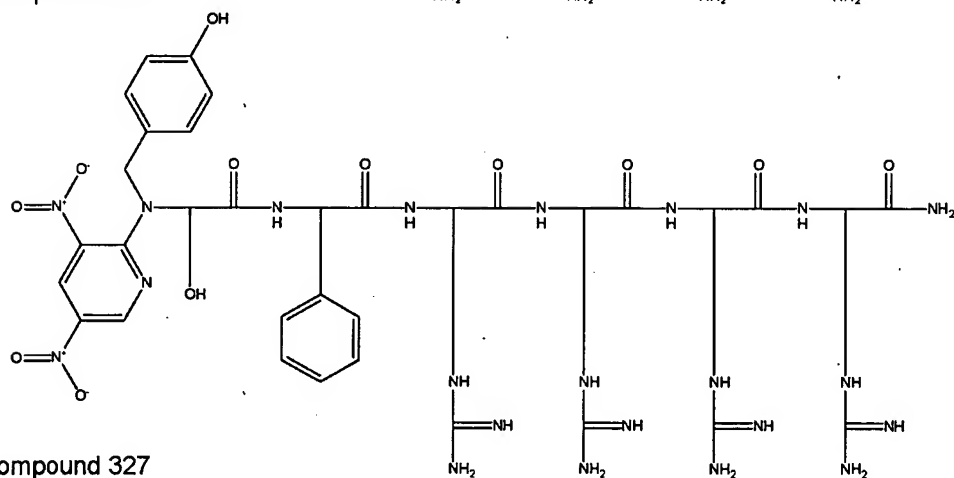
Serial No.: 10/755,086

Filed: January 9, 2004

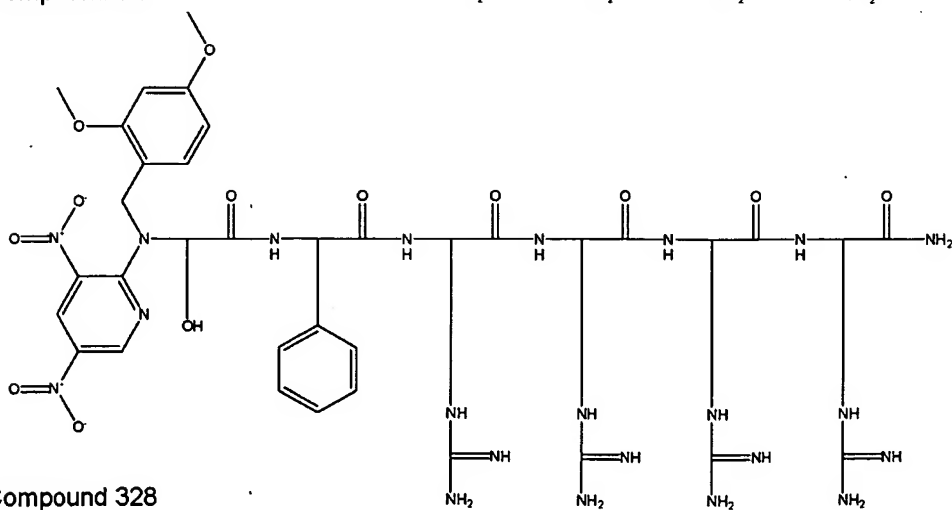
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Compound 326

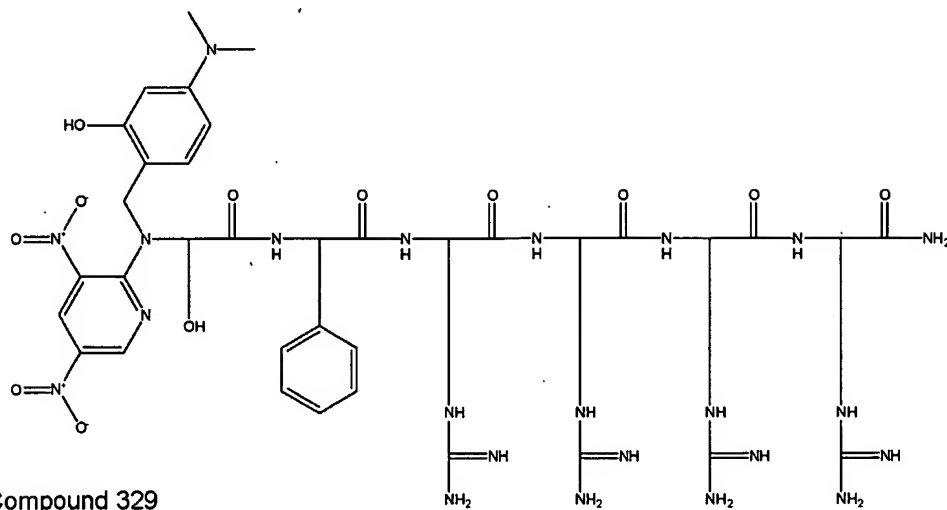


Compound 327

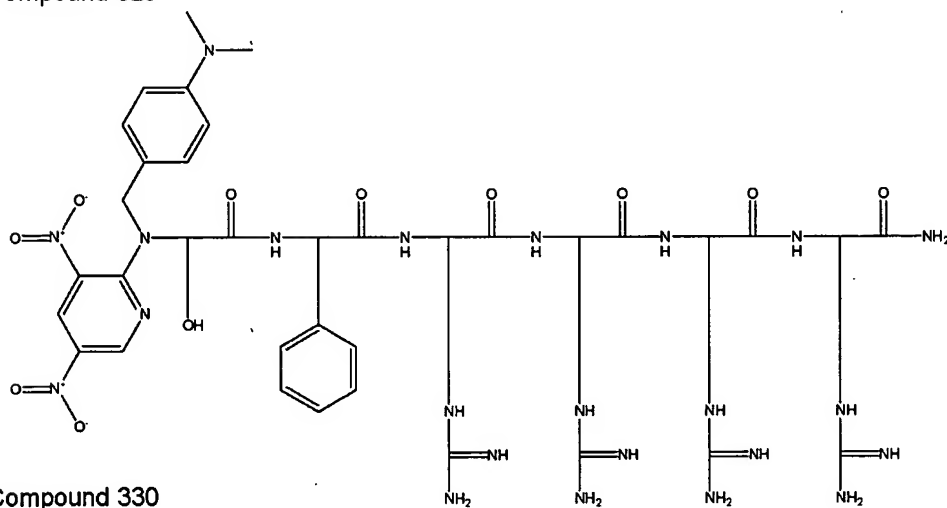


Compound 328

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Compound 329



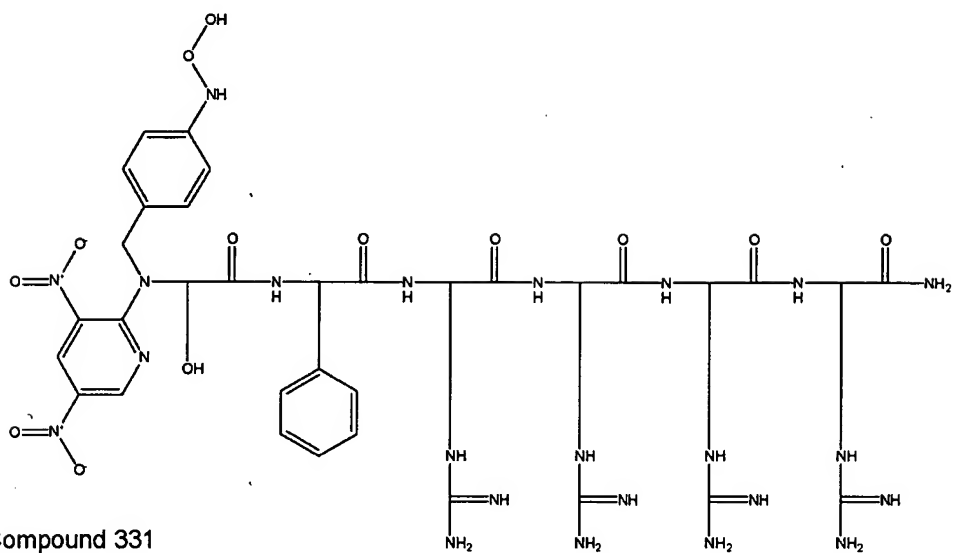
Compound 330

Applicant: David S. Lawrence

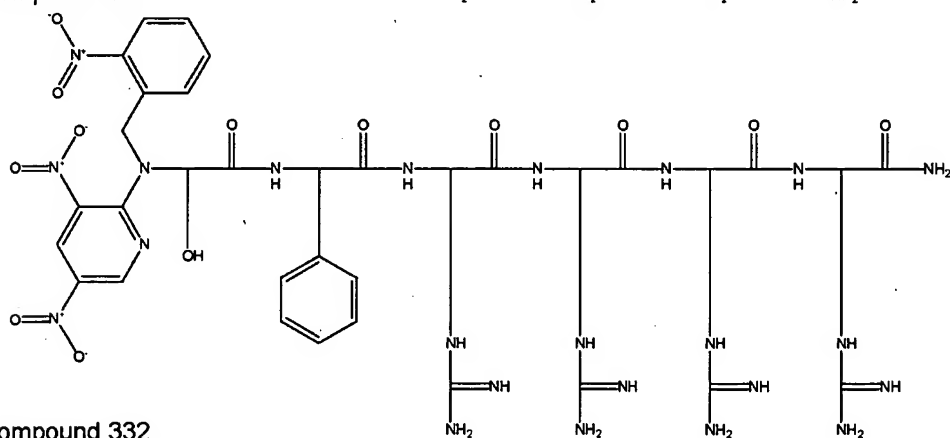
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Compound 331



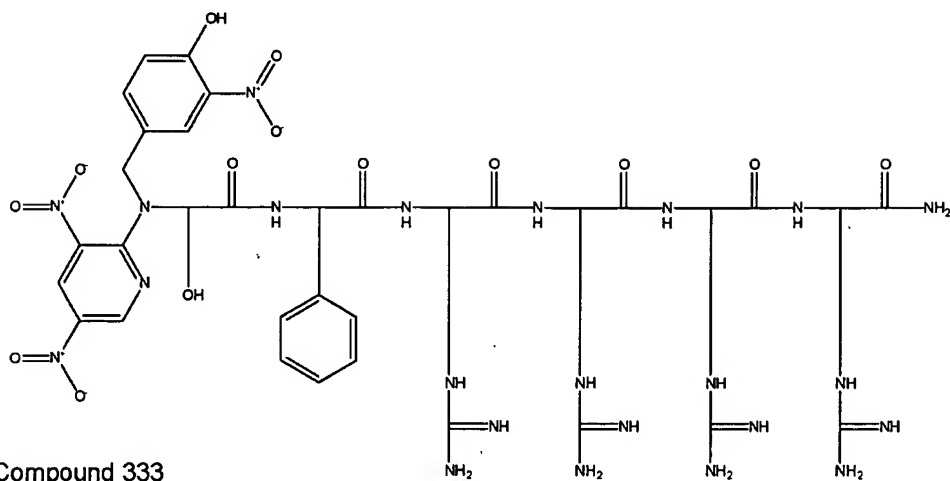
Compound 332

Applicant: David S. Lawrence

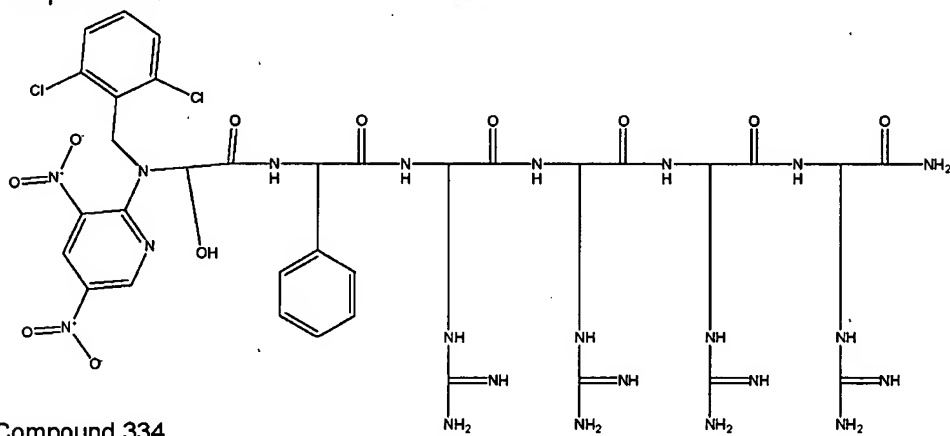
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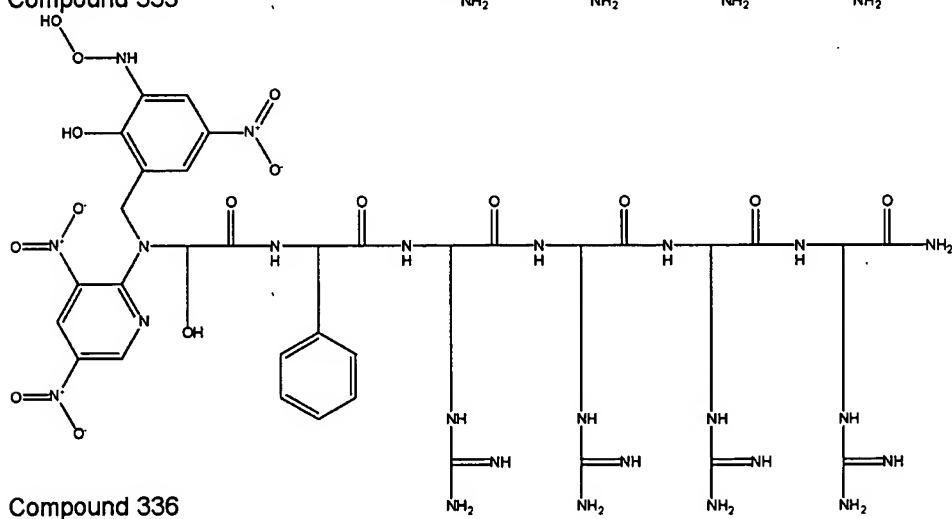
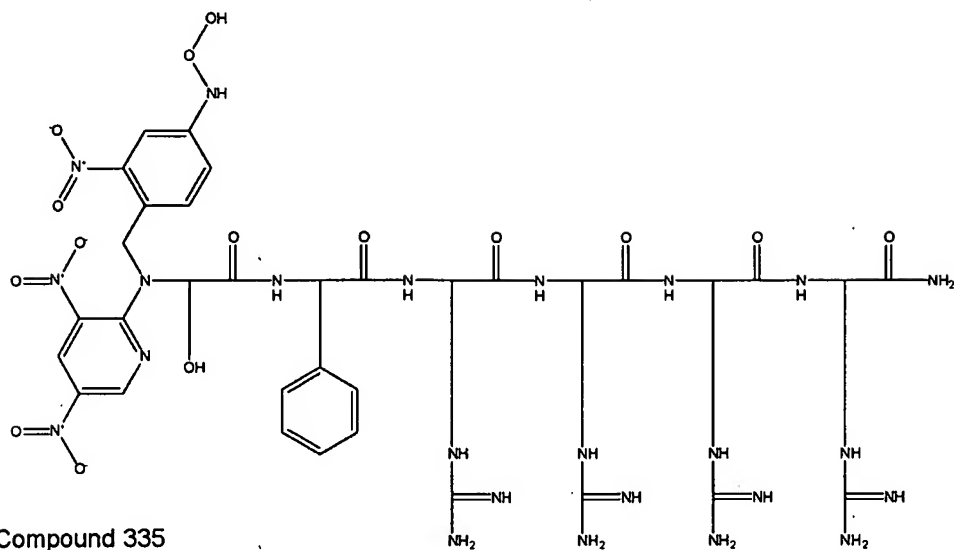


Compound 333



Compound 334

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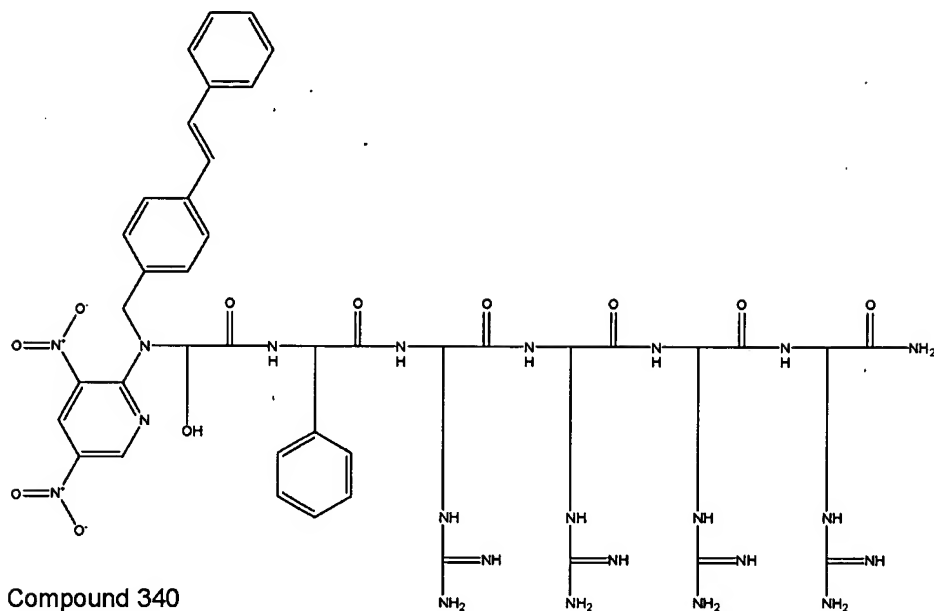


Applicant: David S. Lawrence

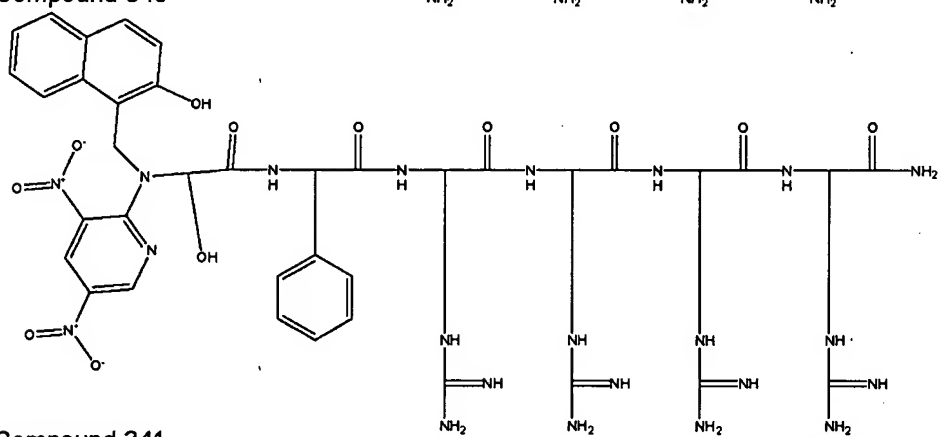
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Compound 340



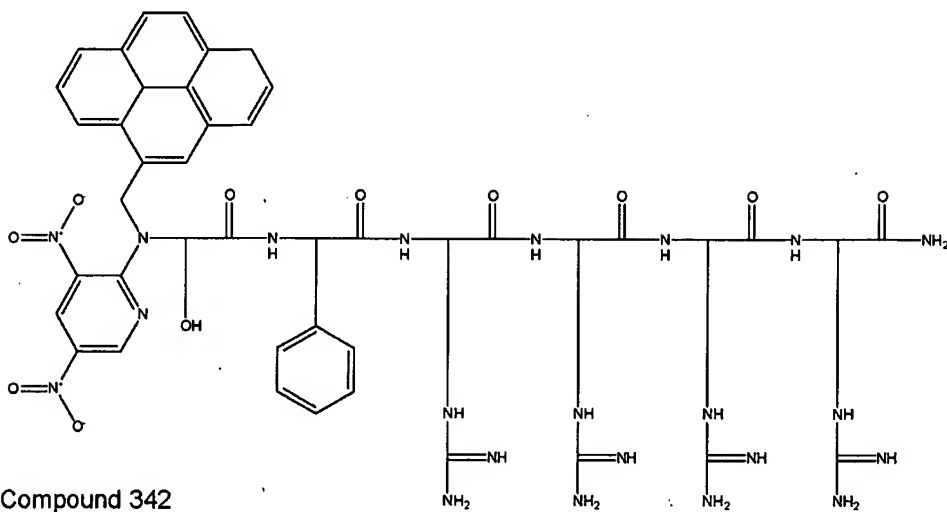
Compound 341

Applicant: David S. Lawrence

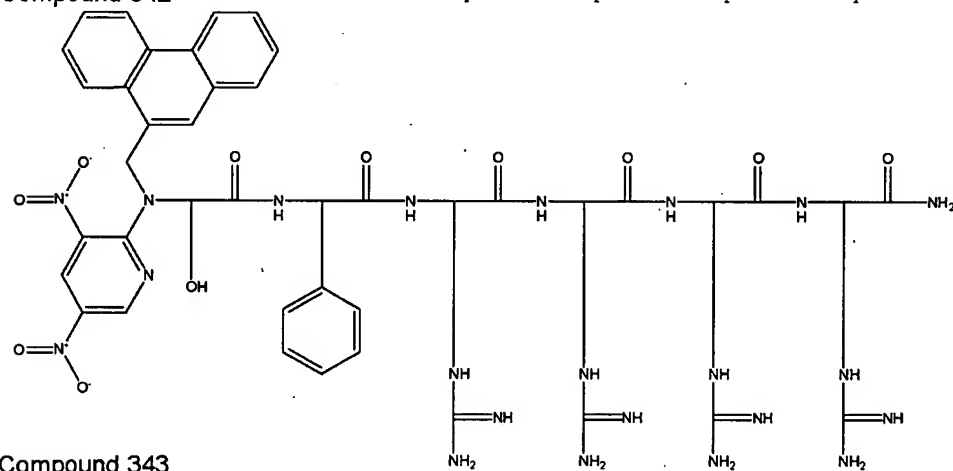
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Compound 342

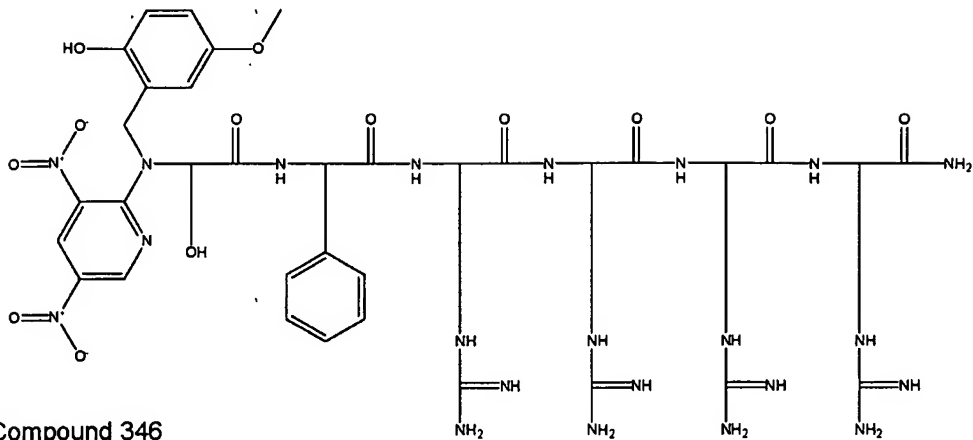


Compound 343

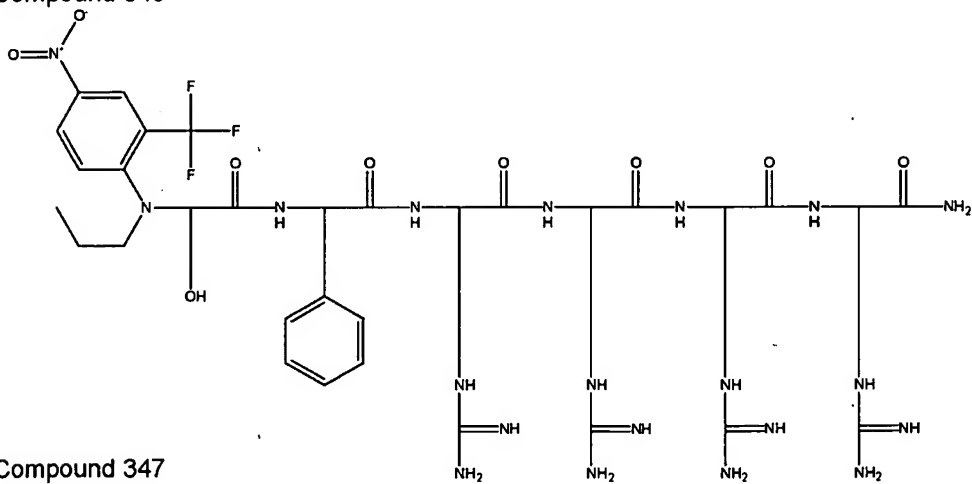
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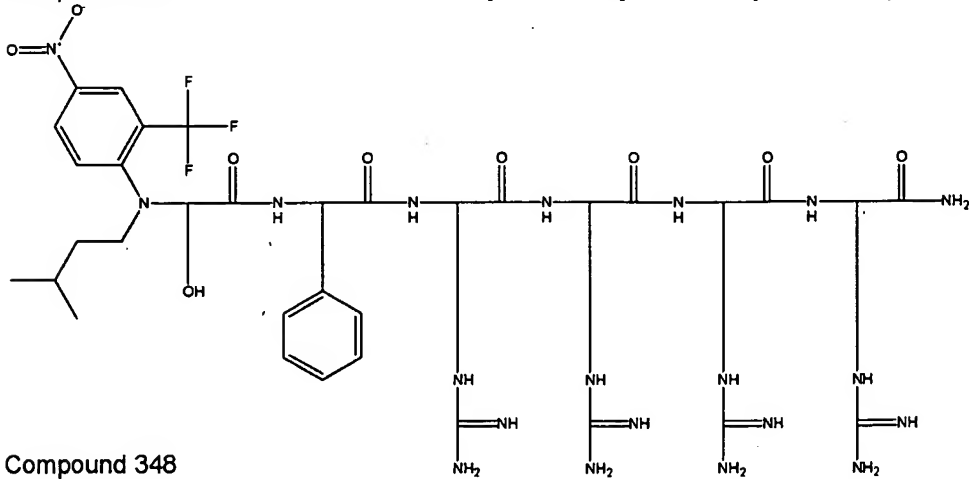
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Compound 346



Compound 347



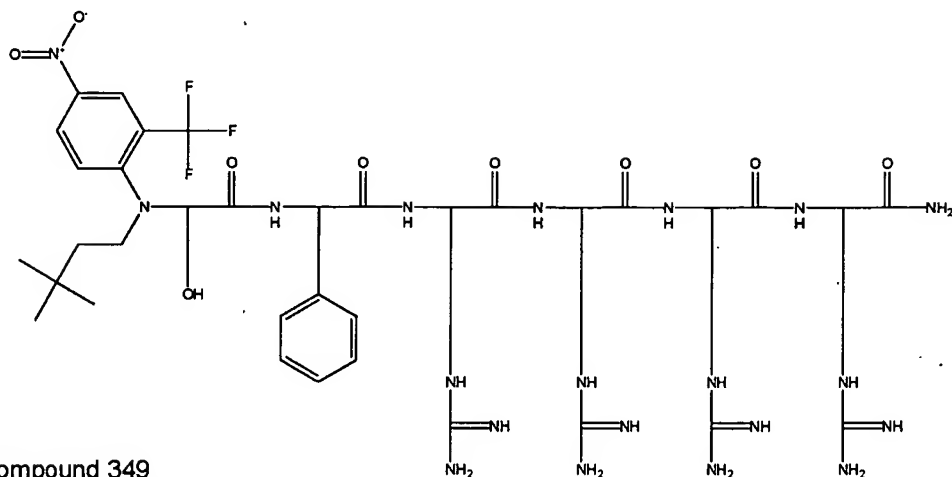
Compound 348

Applicant: David S. Lawrence

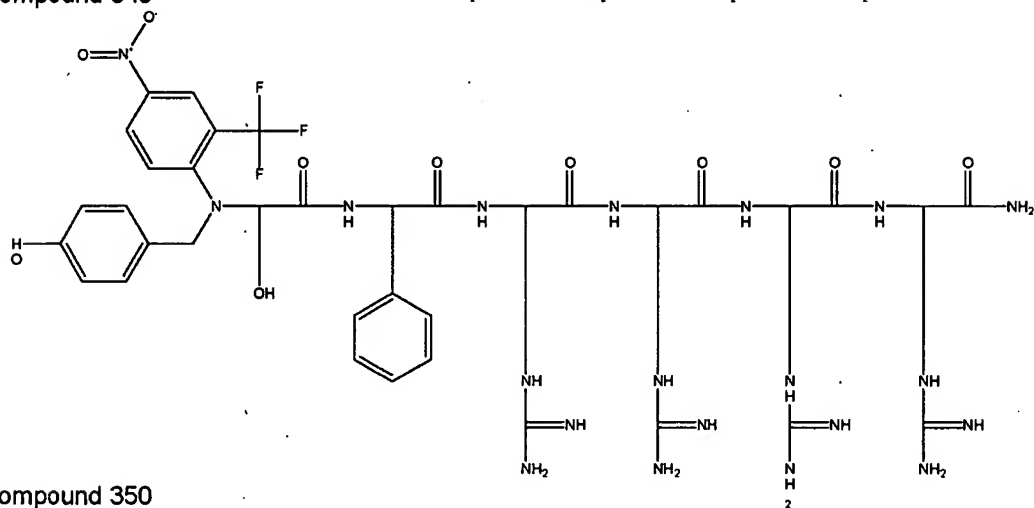
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Compound 349



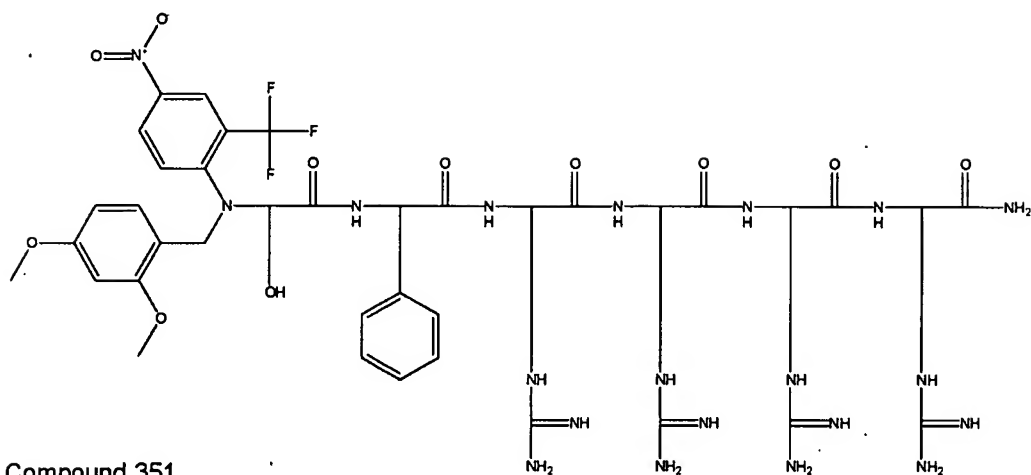
Compound 350

Applicant: David S. Lawrence

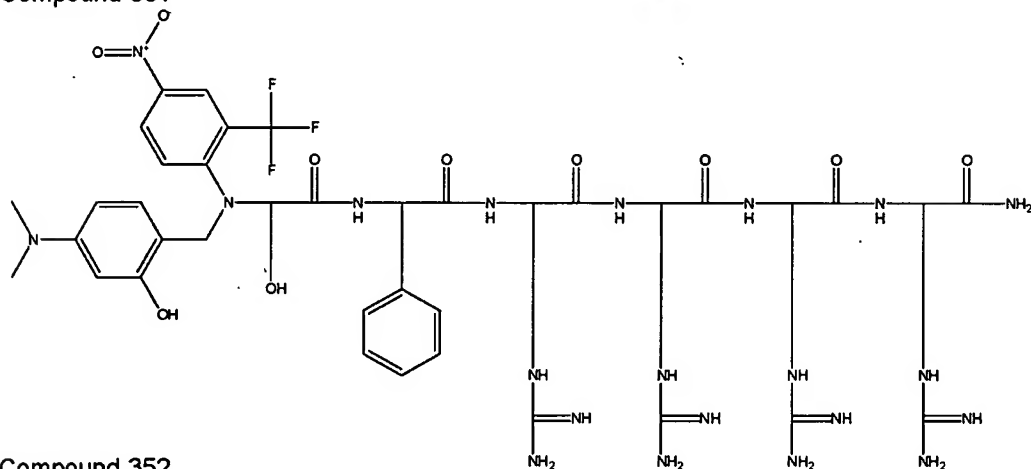
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Compound 351



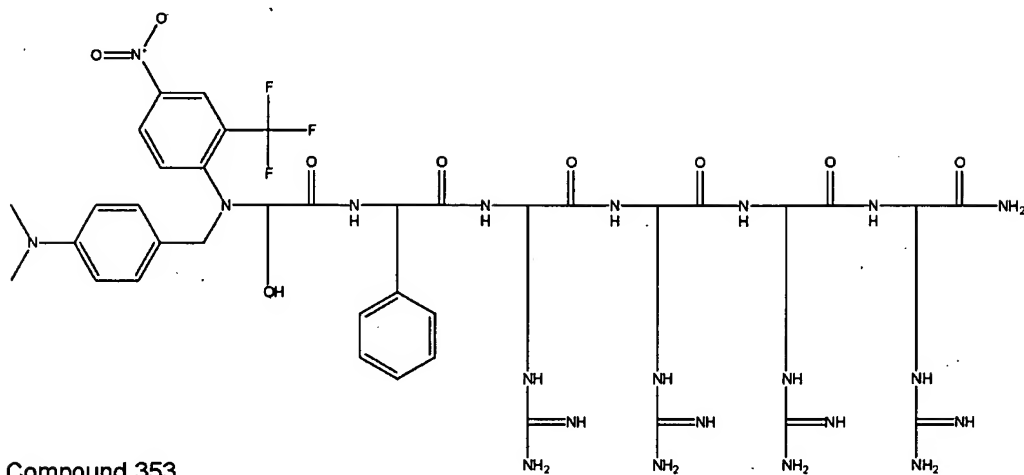
Compound 352

Applicant: David S. Lawrence

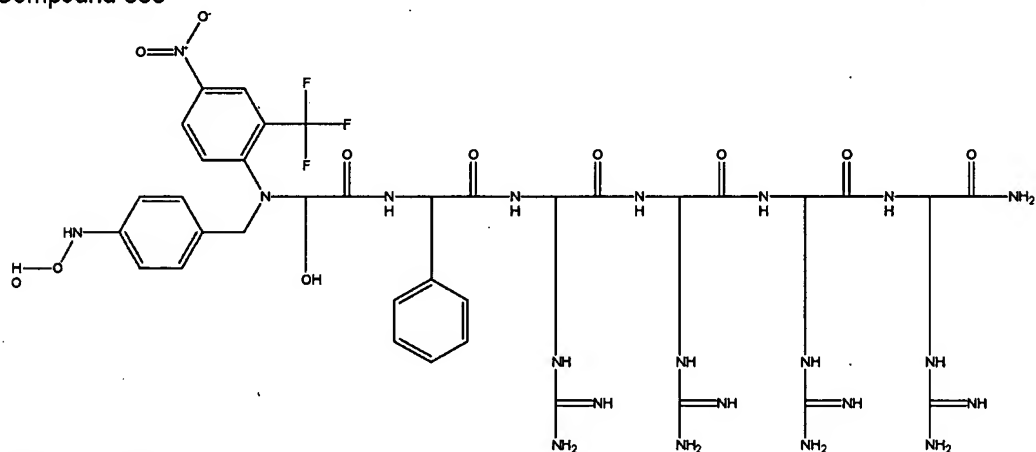
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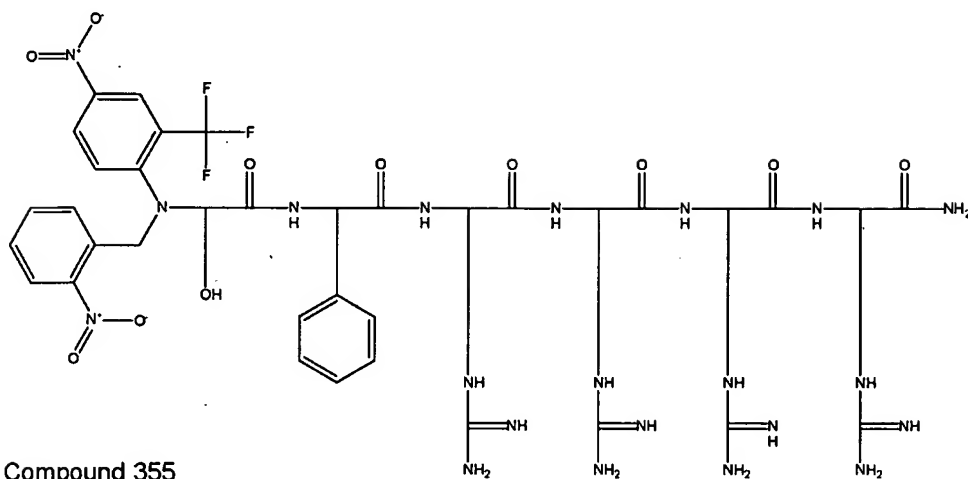


Compound 353

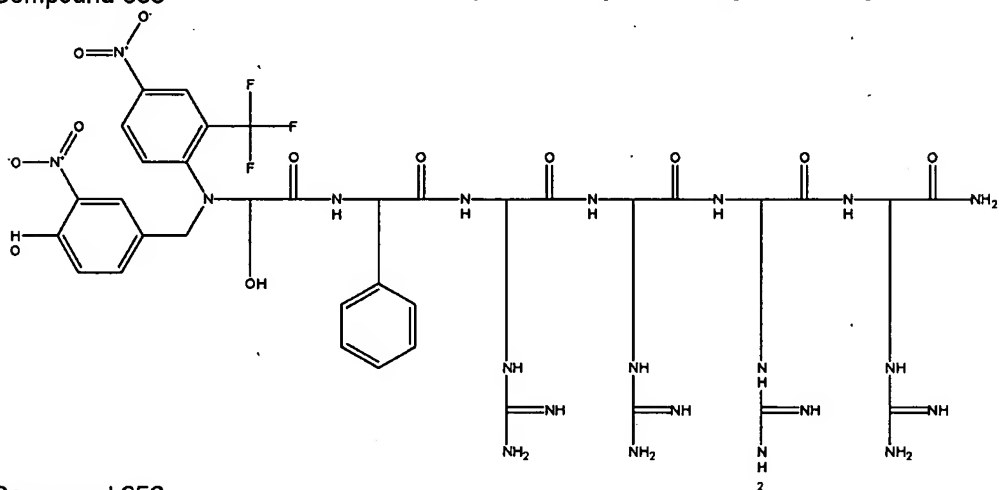


Compound 354

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Compound 355



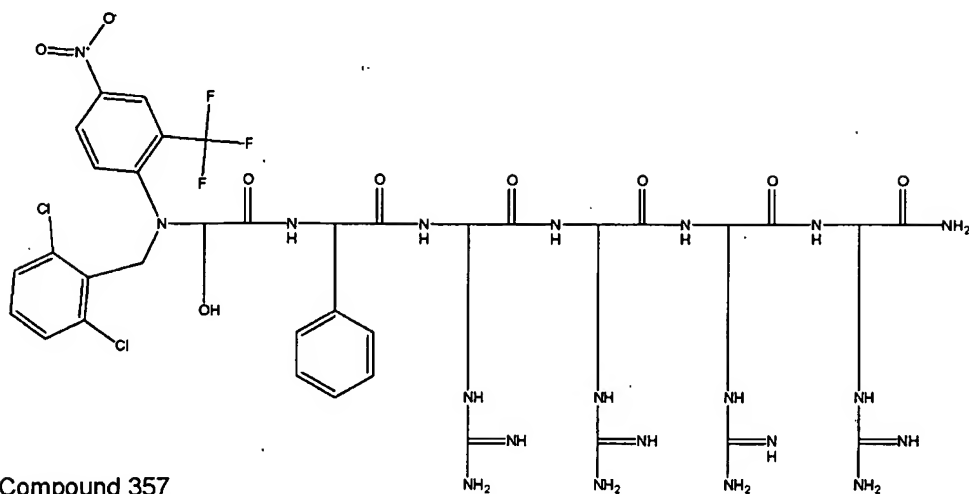
Compound 356

Applicant: David S. Lawrence

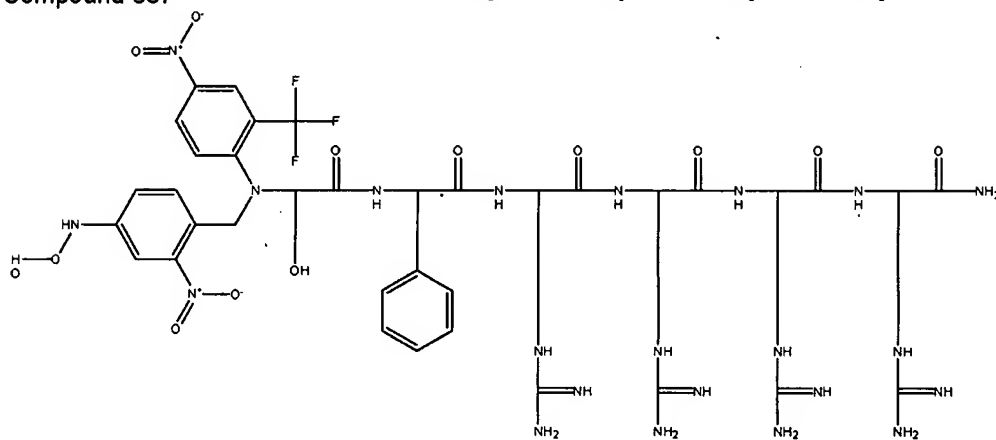
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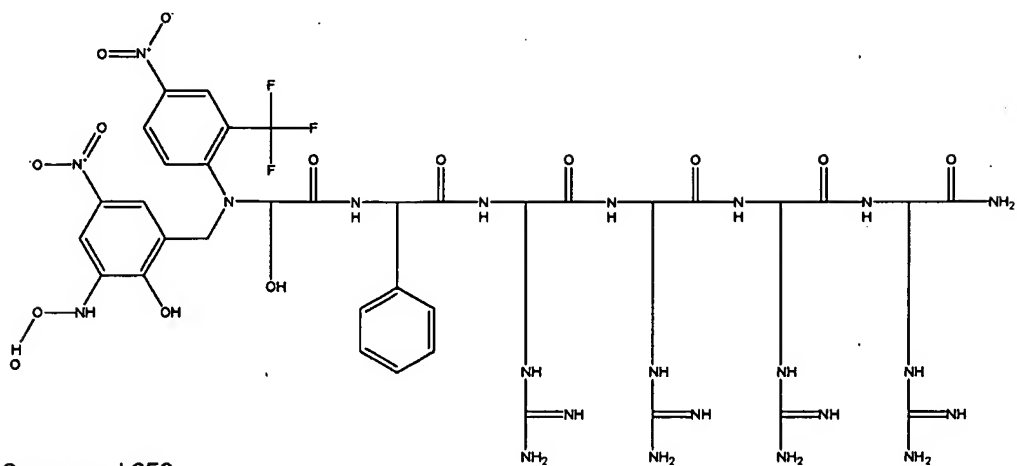


Compound 357

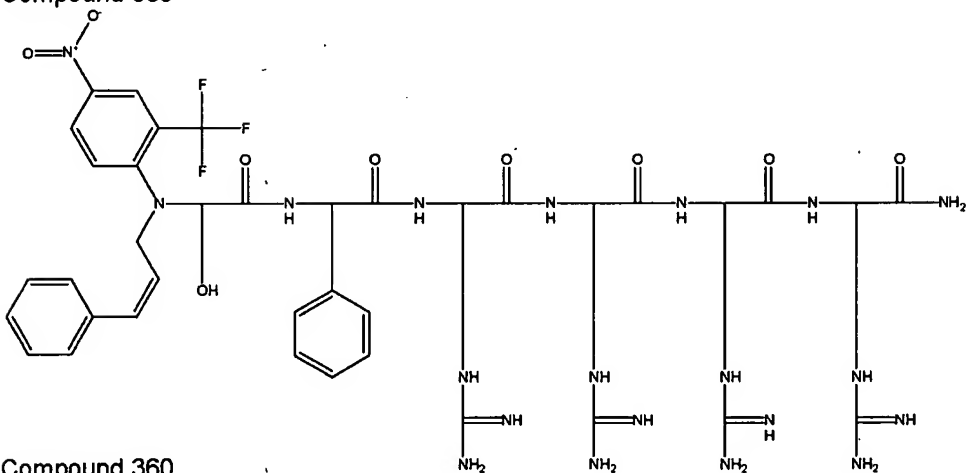


Compound 358

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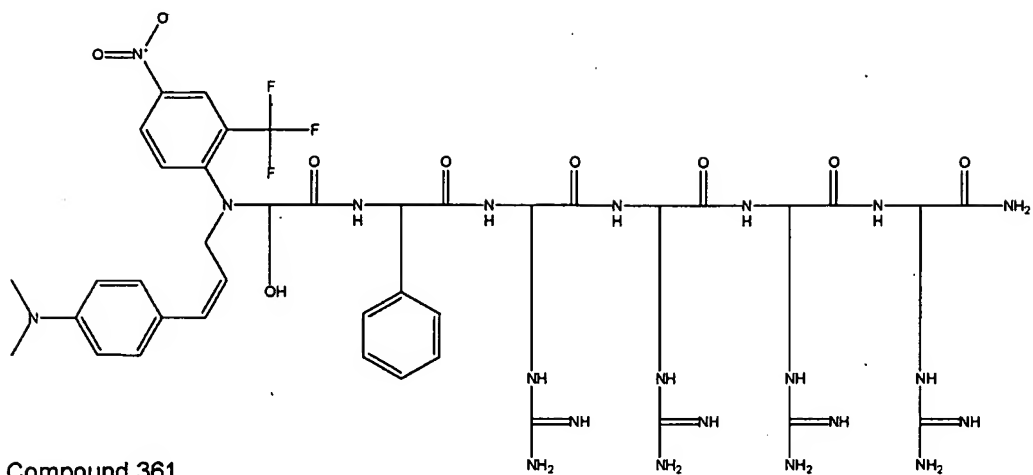


Compound 359

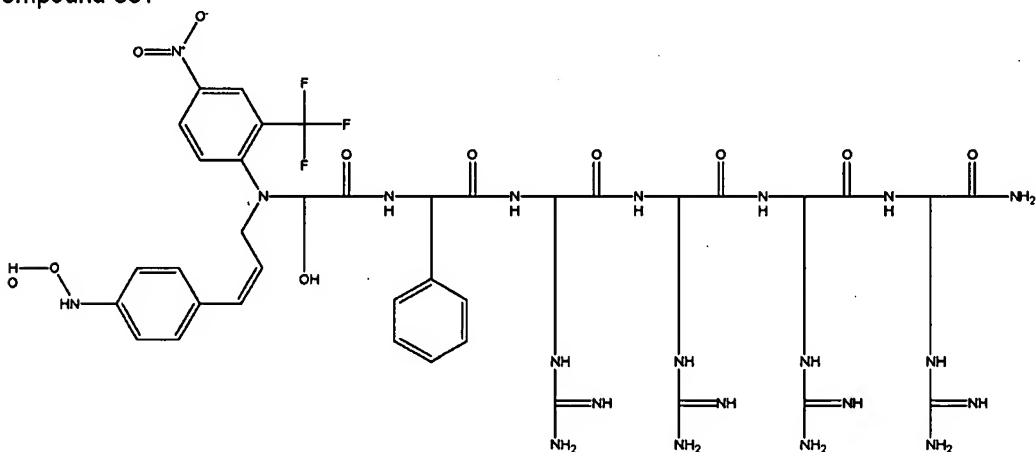


Compound 360

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Compound 361



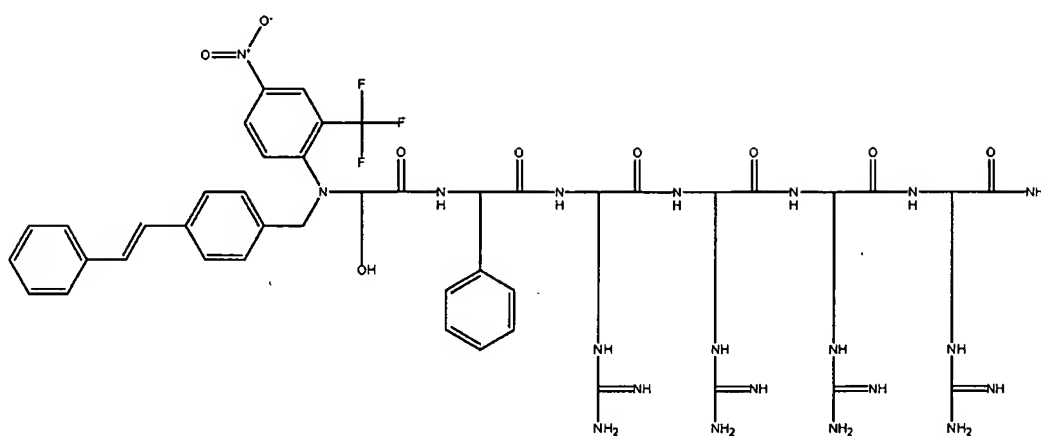
Compound 362

Applicant: David S. Lawrence

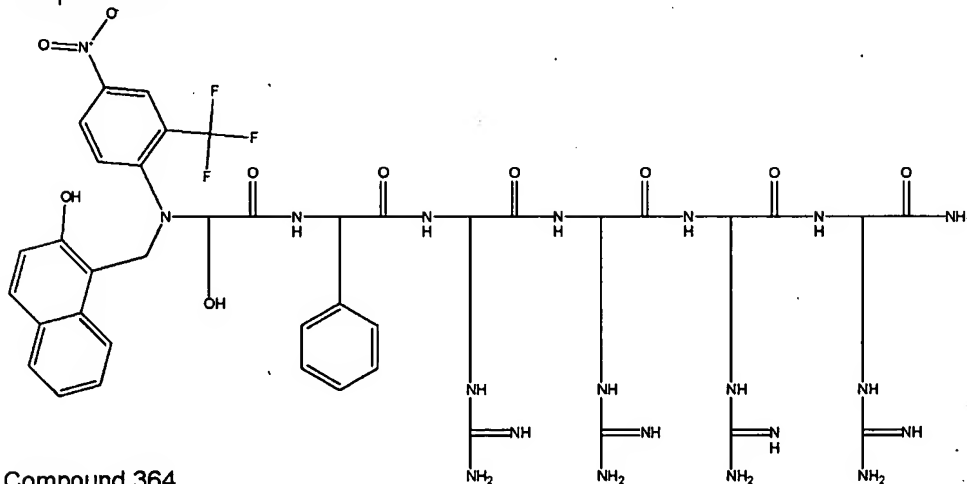
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Compound 363



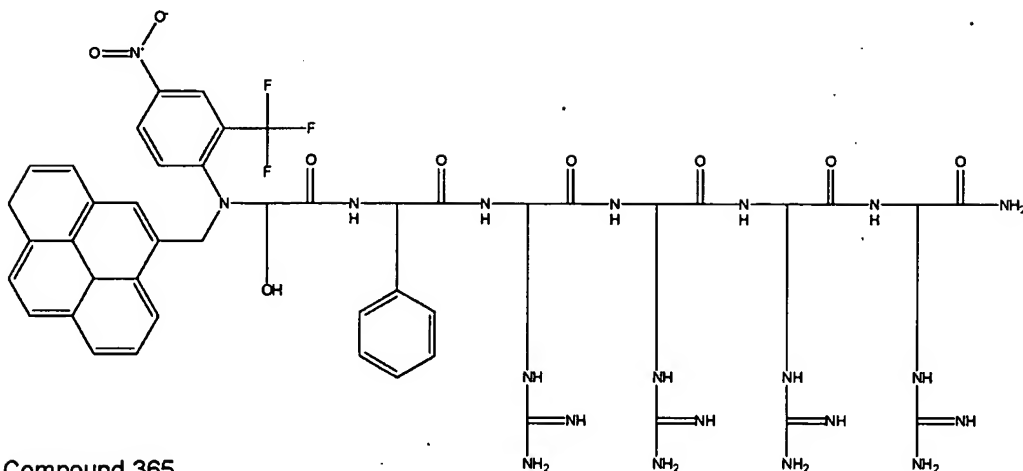
Compound 364

Applicant: David S. Lawrence

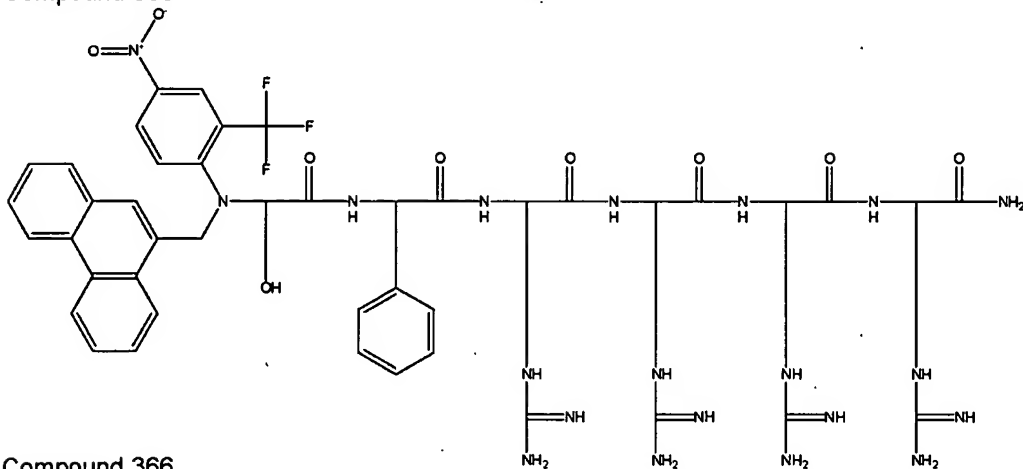
Serial No.: 10/755,086

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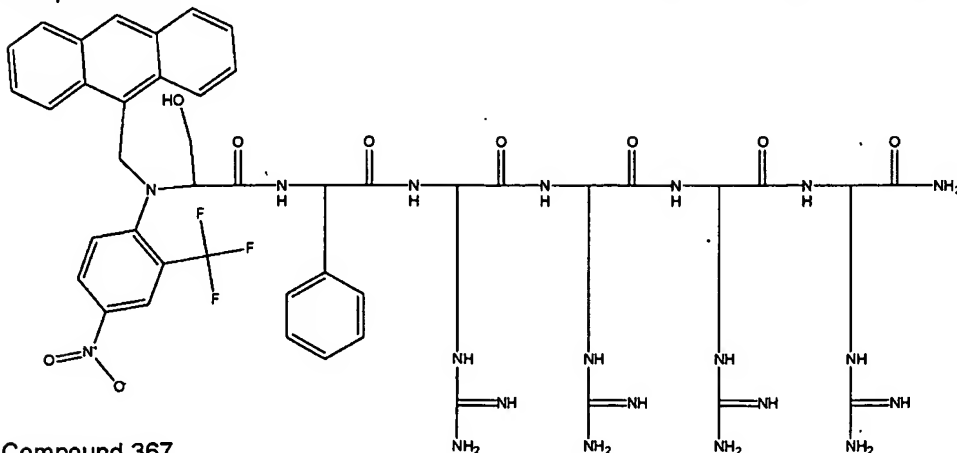
page 160 of 193



Compound 365

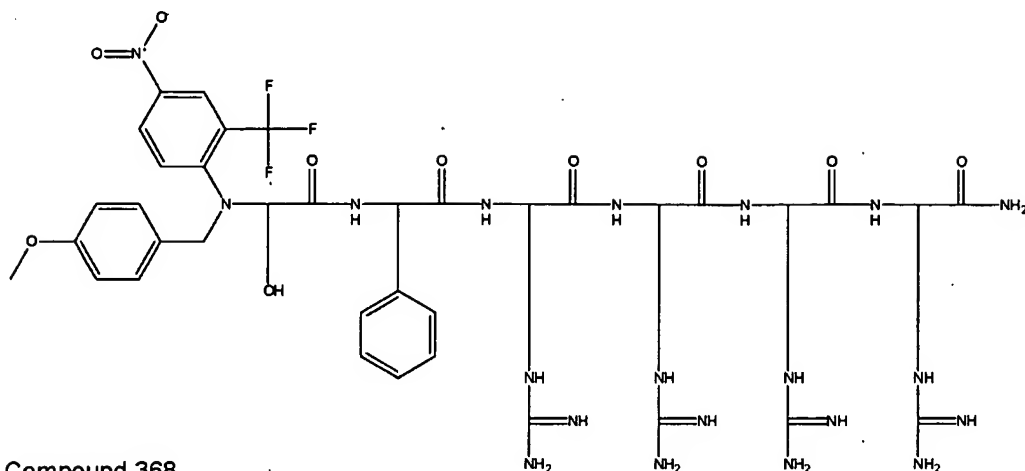


Compound 366

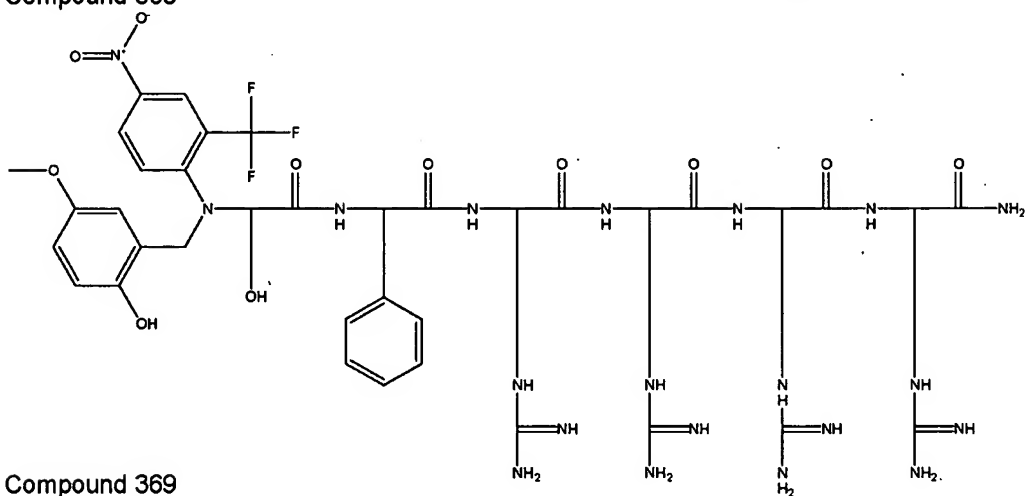


Compound 367

Applicant: David S. Lawrence
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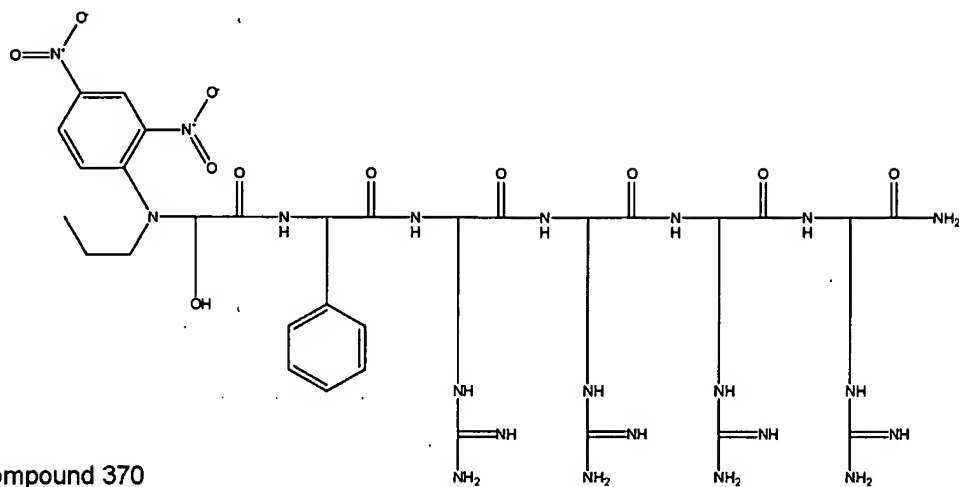


Compound 368

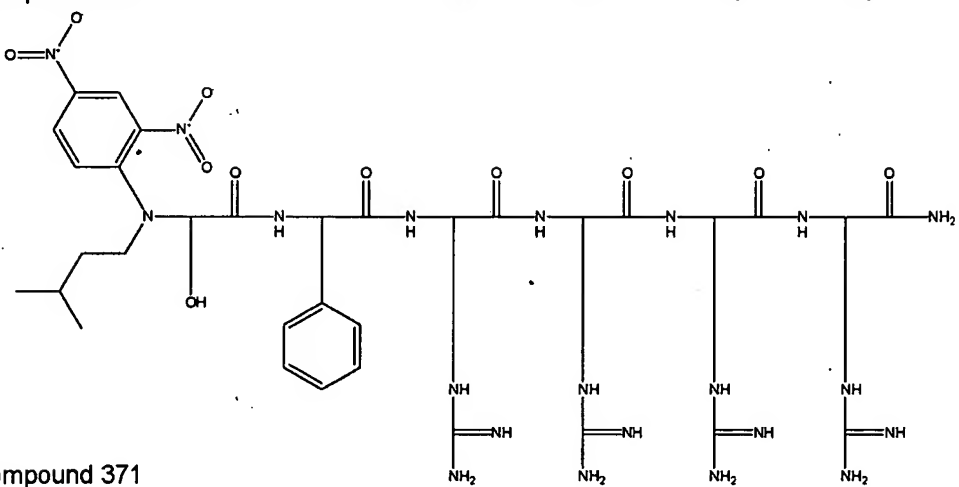


Compound 369

Applicant: David S. Lawrence
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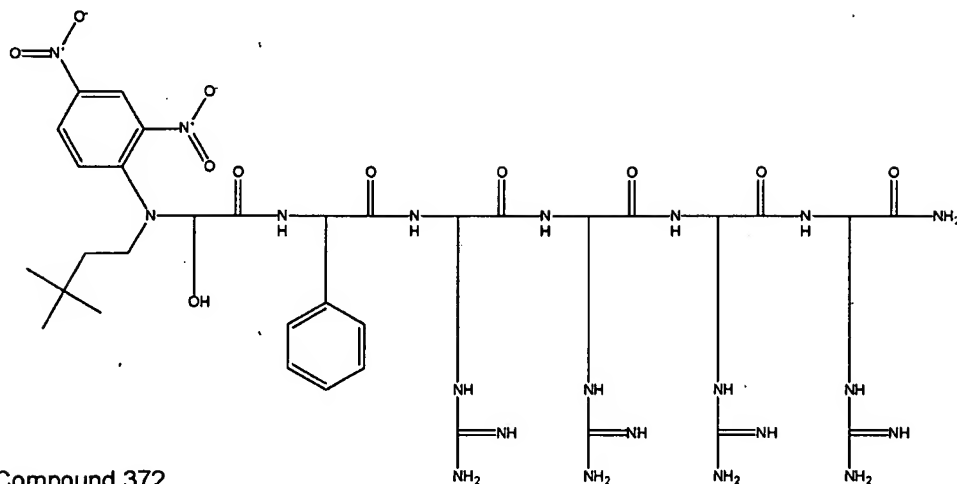


Compound 370

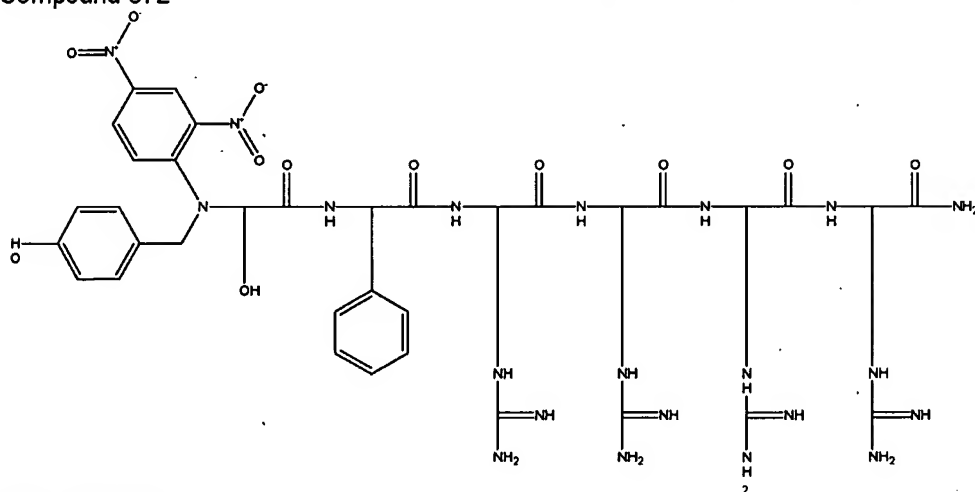


Compound 371

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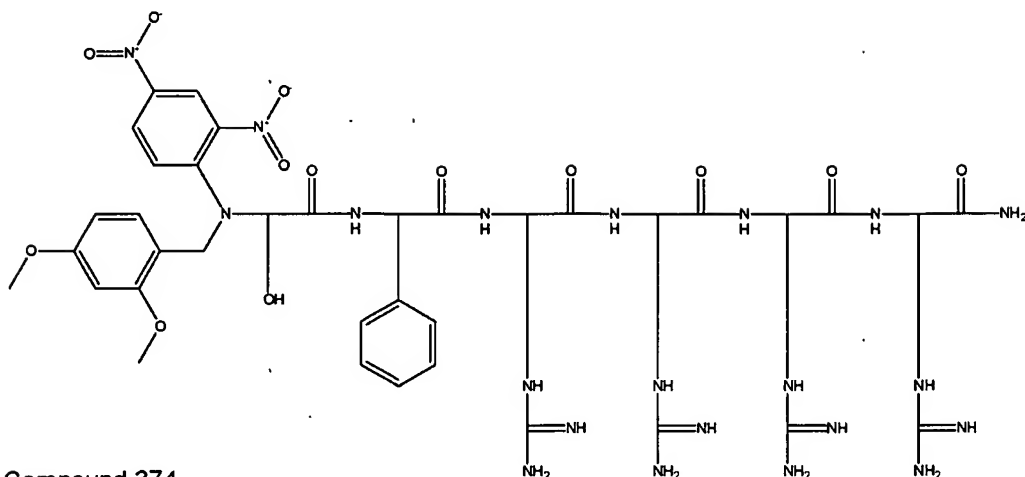


Compound 372

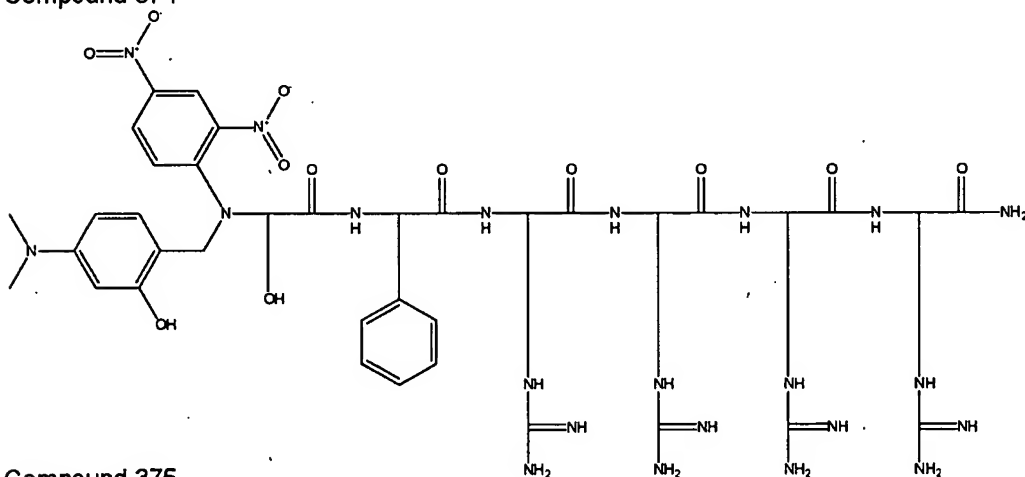


Compound 373

Applicant: David S. Lawrence
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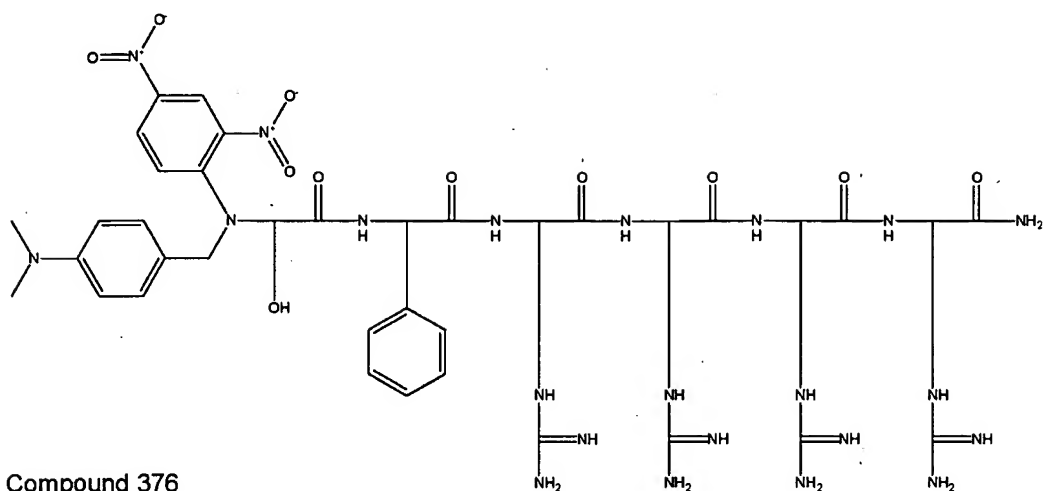


Compound 374

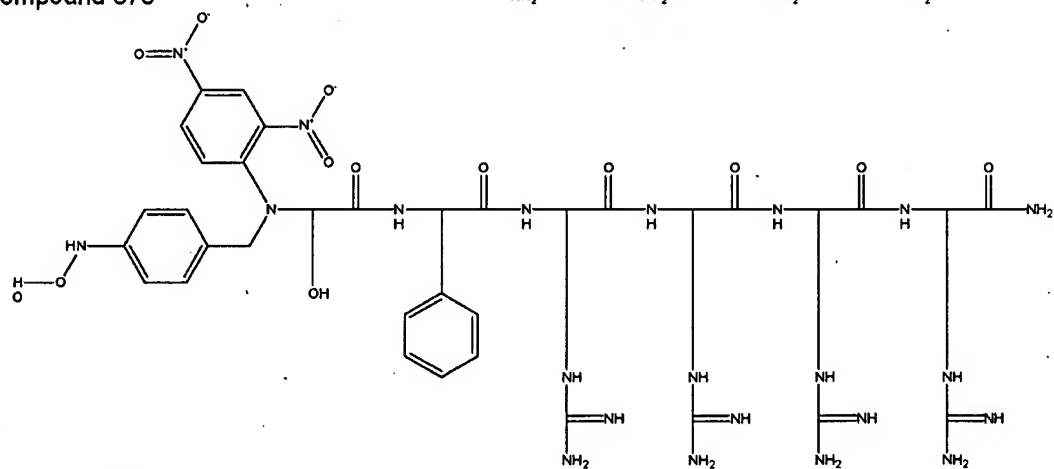


Compound 375

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Compound 376



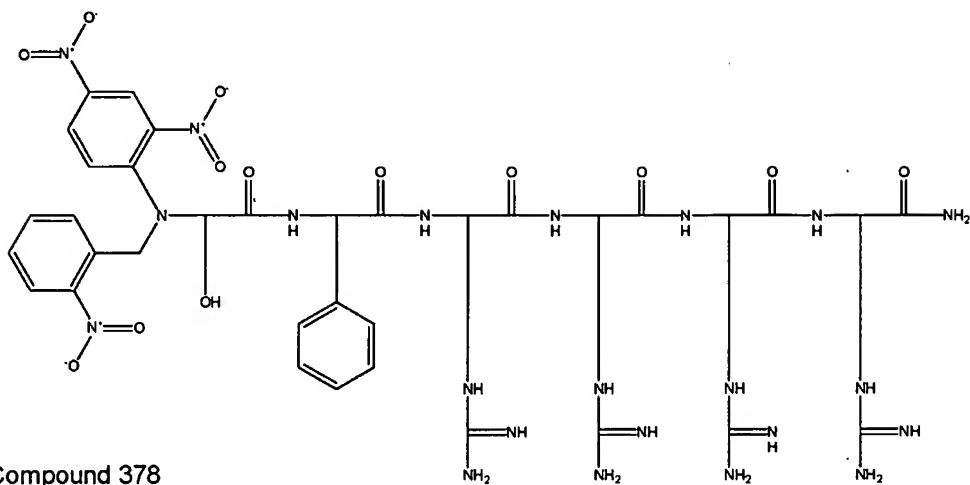
Compound 377

Applicant: David S. Lawrence

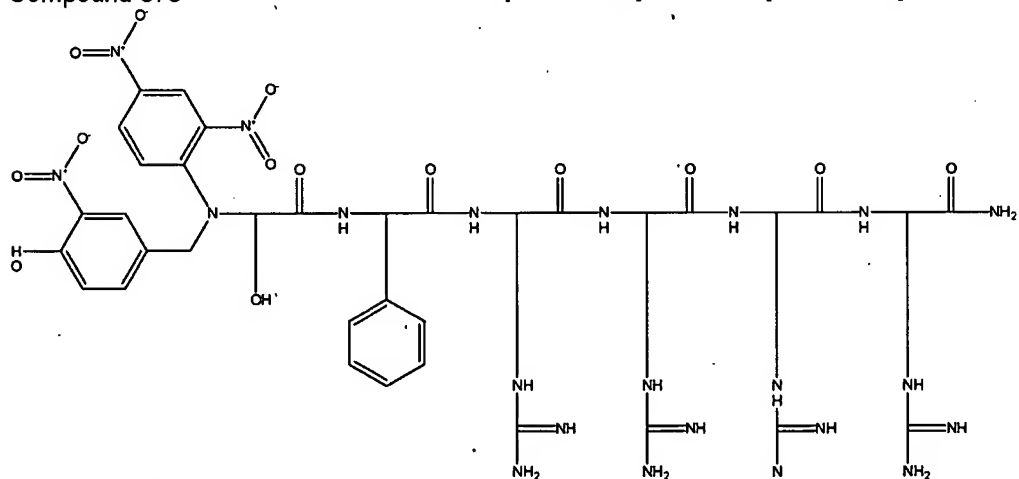
Serial No.: 10/755,086

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Compound 378



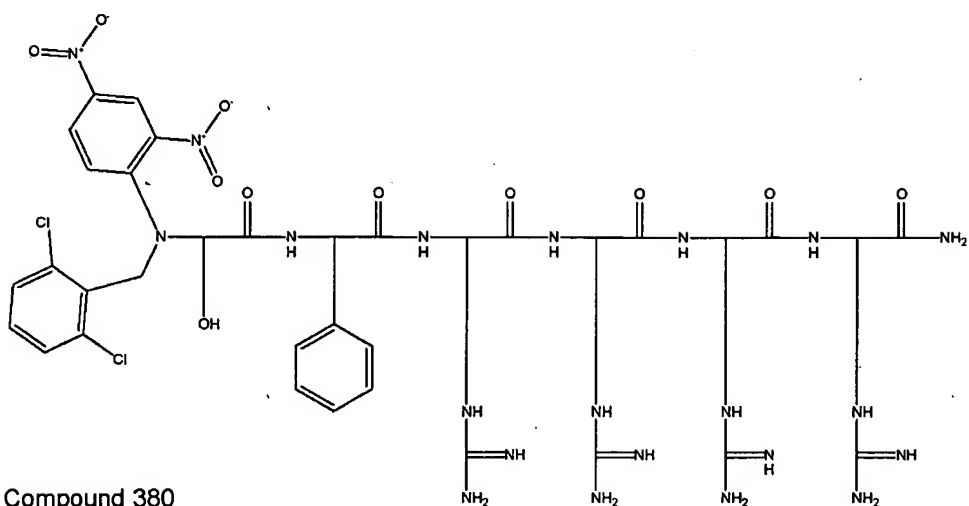
Compound 379

Applicant: David S. Lawrence

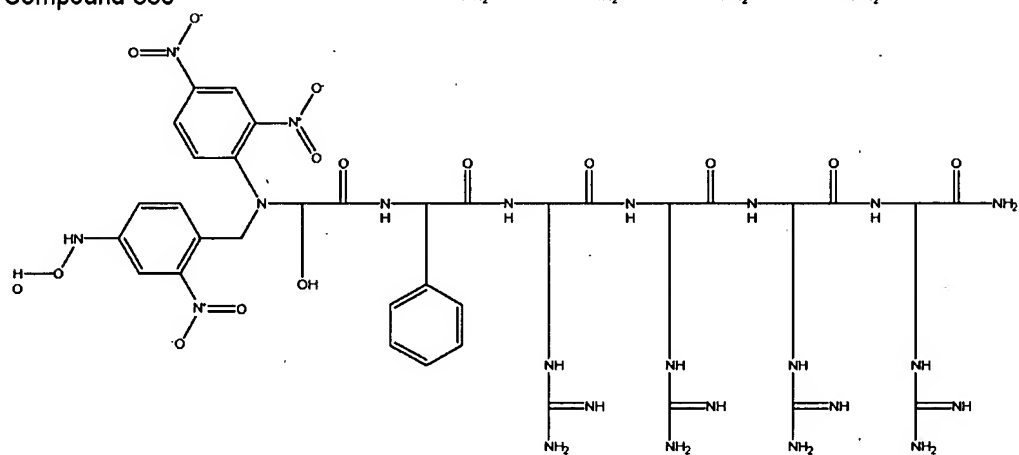
Serial No.: 10/755,086

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Compound 380



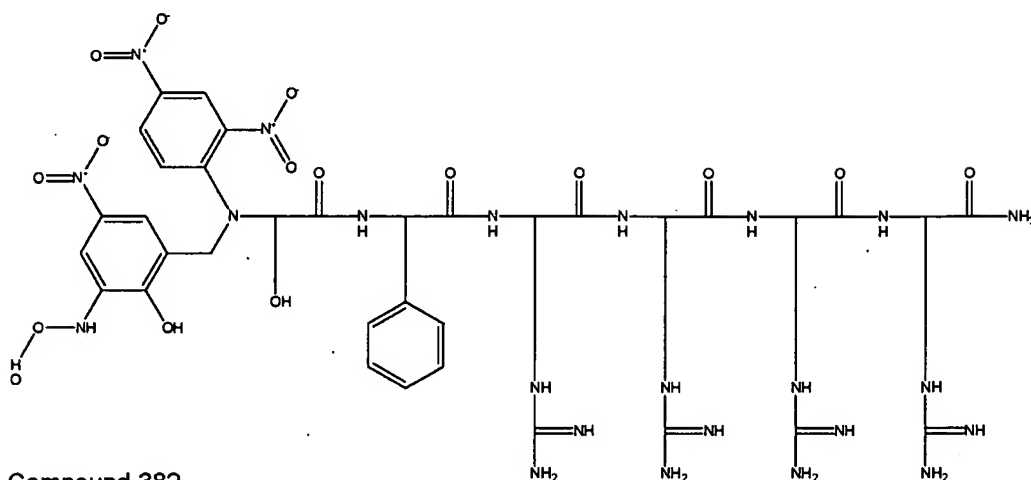
Compound 381

Applicant: David S. Lawrence

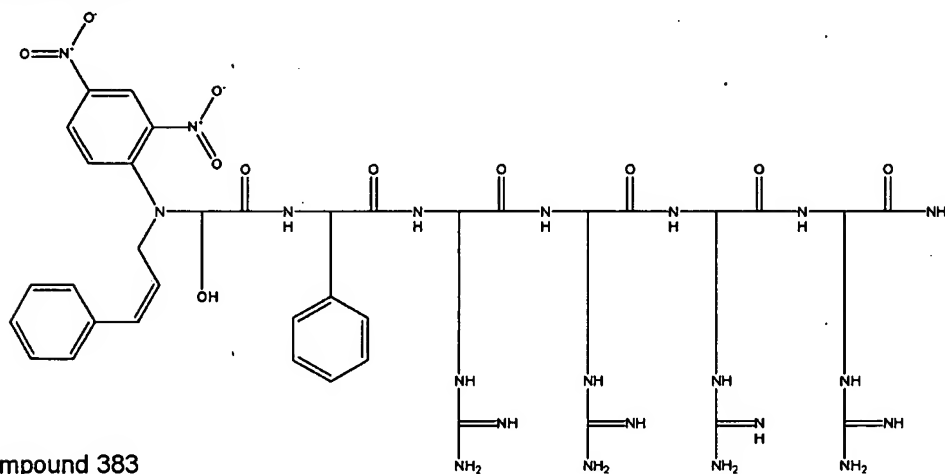
Serial No.: 10/755,086

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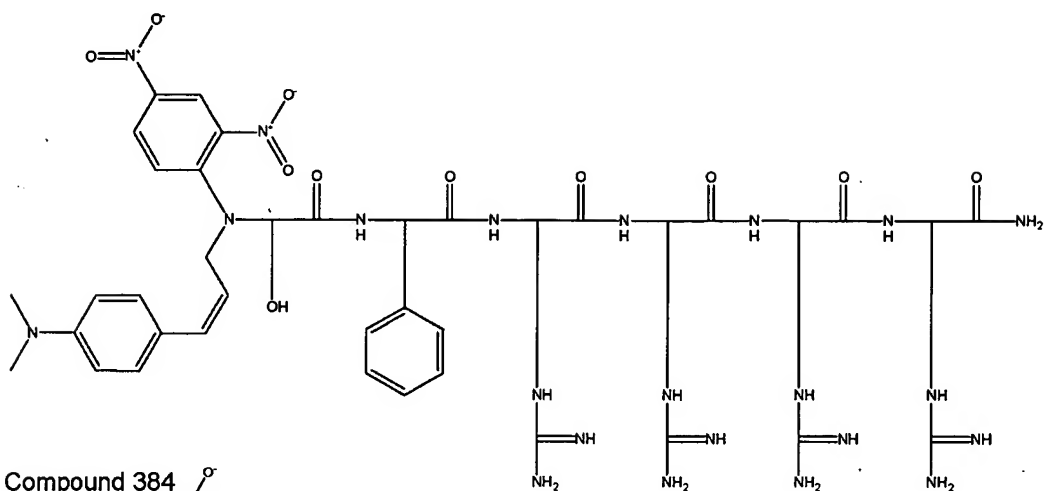


Compound 382

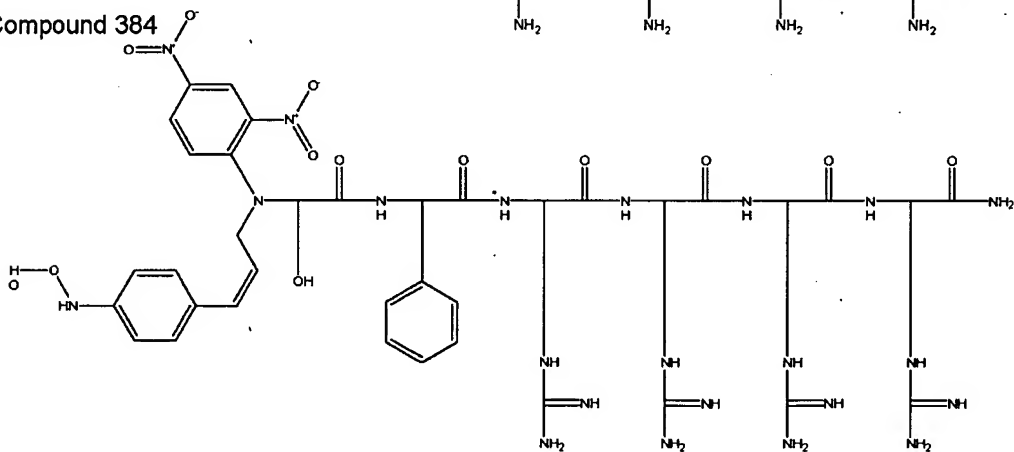


Compound 383

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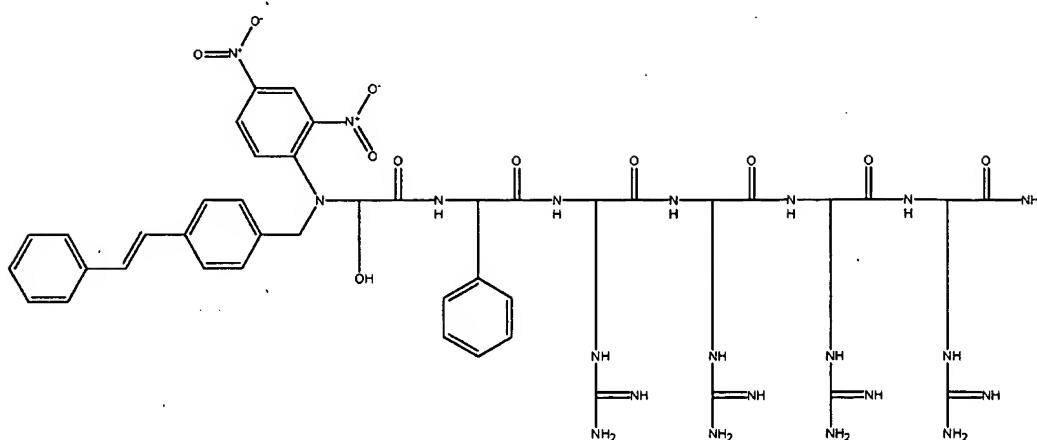


Compound 384

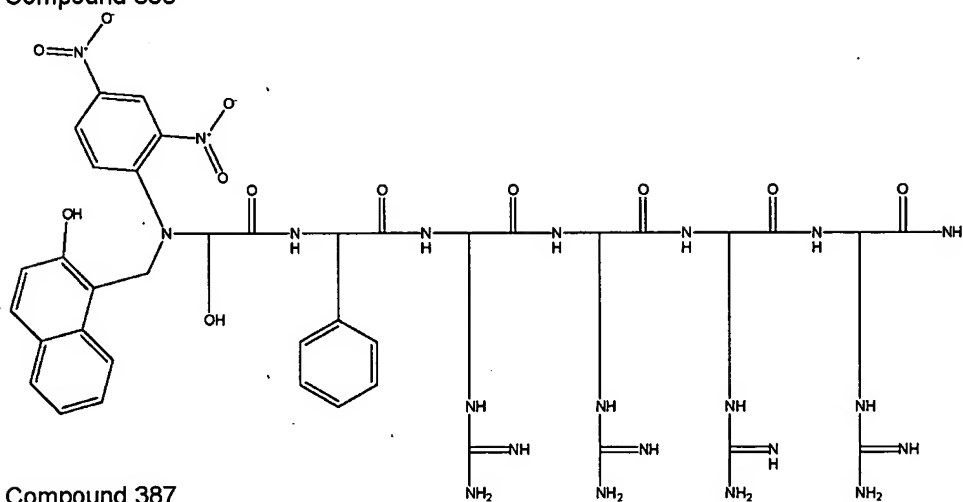


Compound 385

Applicant: David S. Lawrence
Serial No.: 10/755,086
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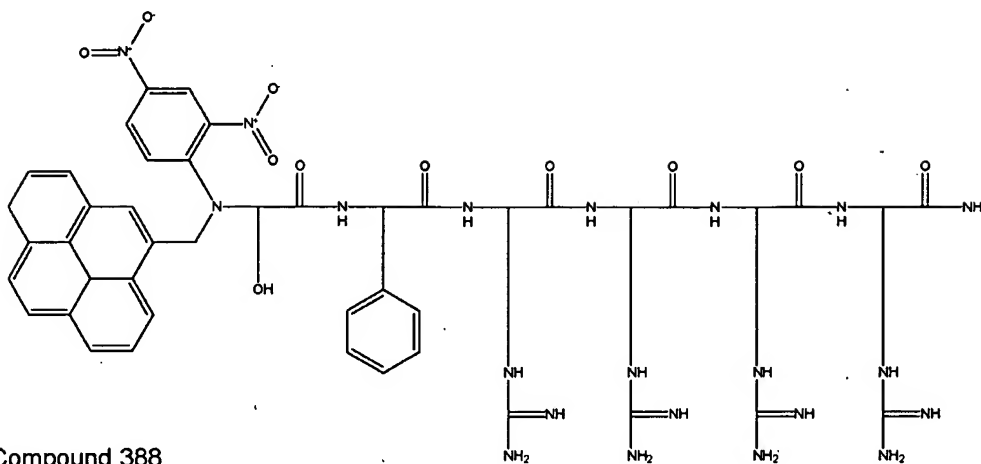


Compound 386

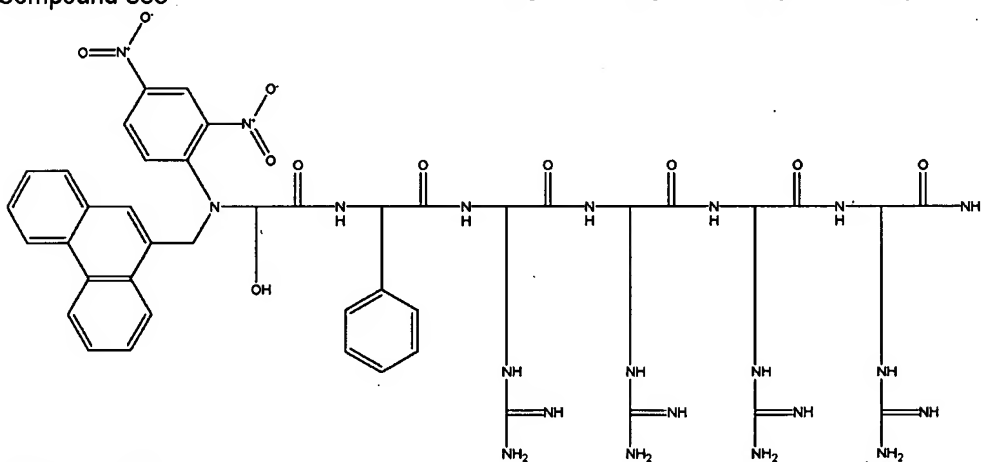


Compound 387

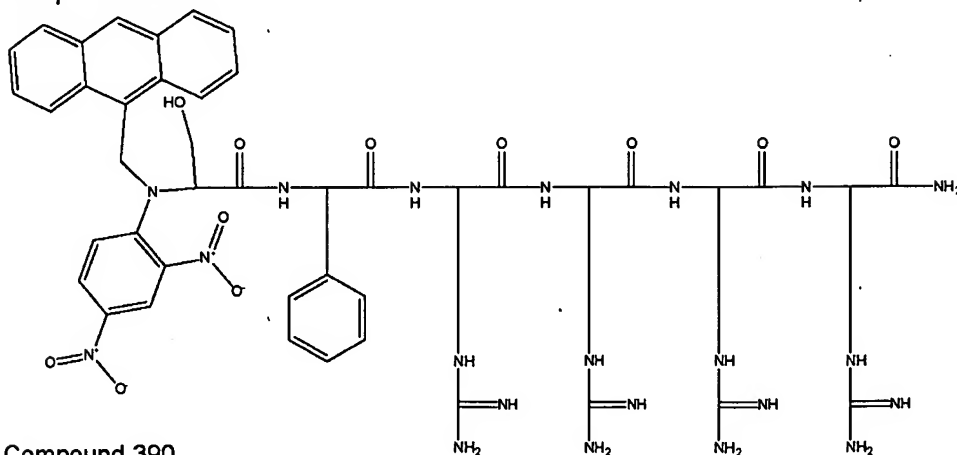
Applicant: David S. Lawrence
Serial No.: 10/755,086
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Compound 388



Compound 389



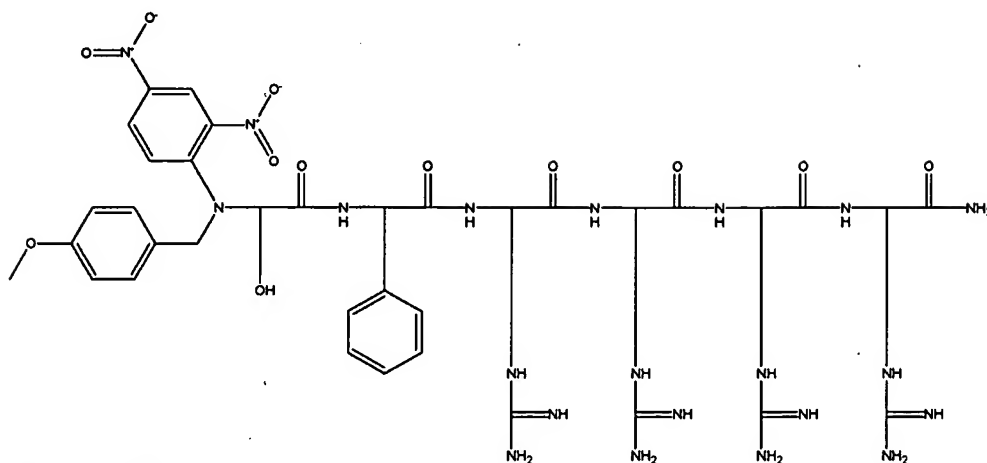
Compound 390

Applicant: David S. Lawrence

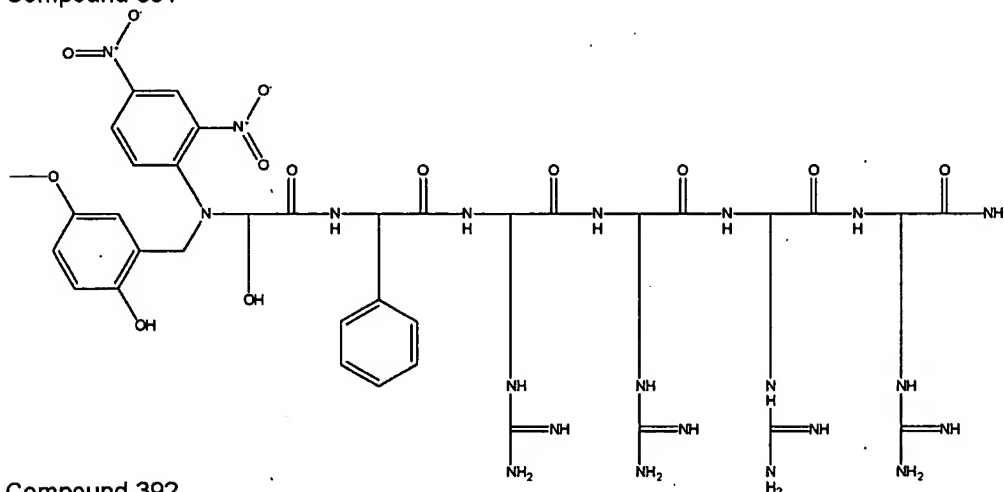
Serial No.: 10/755,086

Filed: January 9, 2004

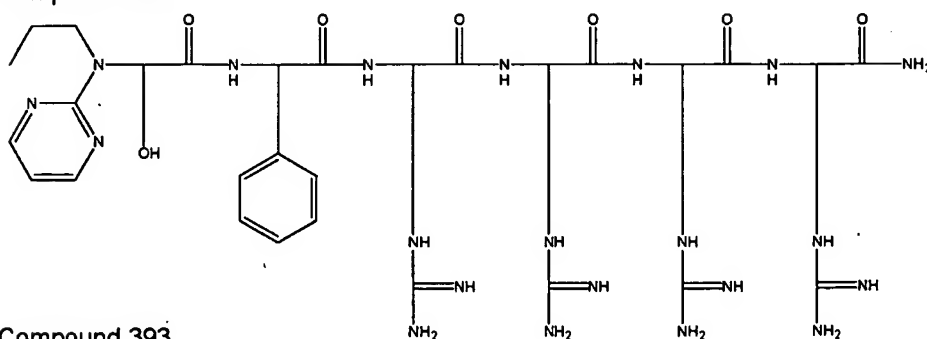
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Compound 391



Compound 392



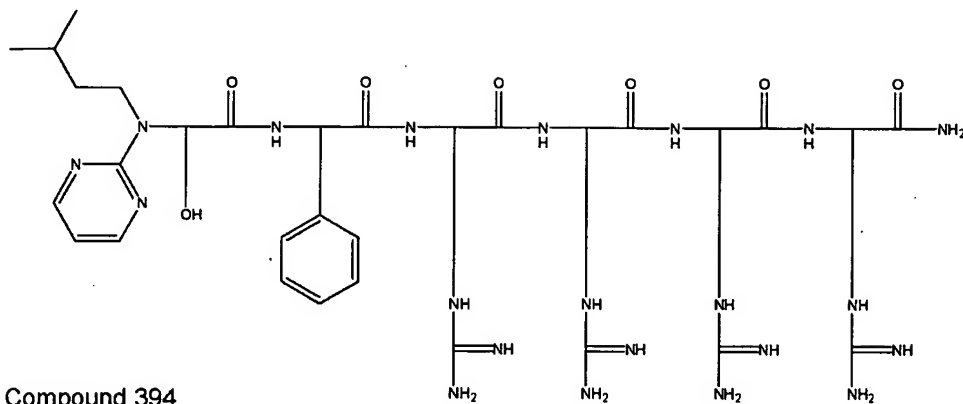
Compound 393

Applicant: David S. Lawrence

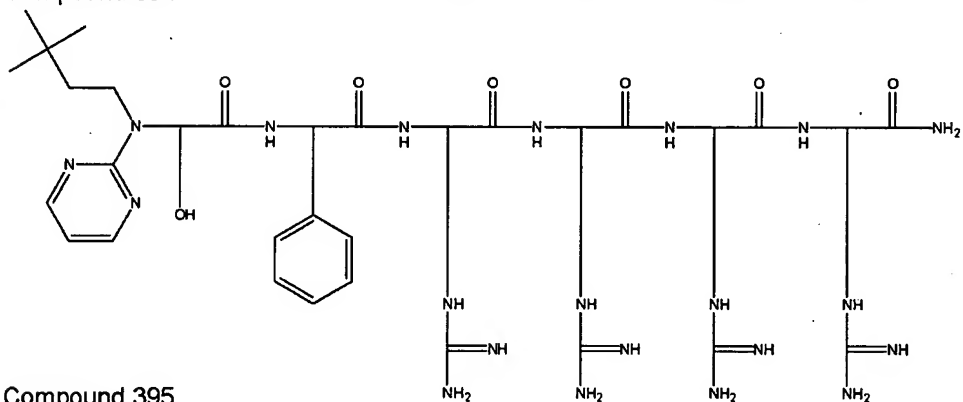
Serial No.: 10/755,086

Filed: January 9, 2004

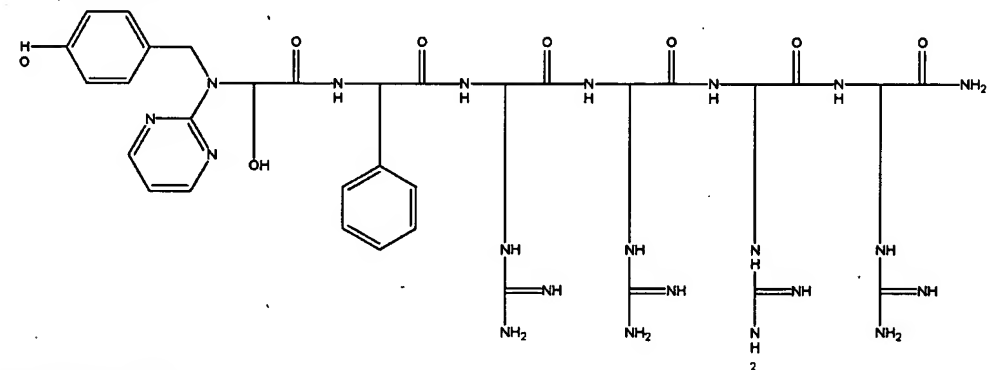
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Compound 394



Compound 395



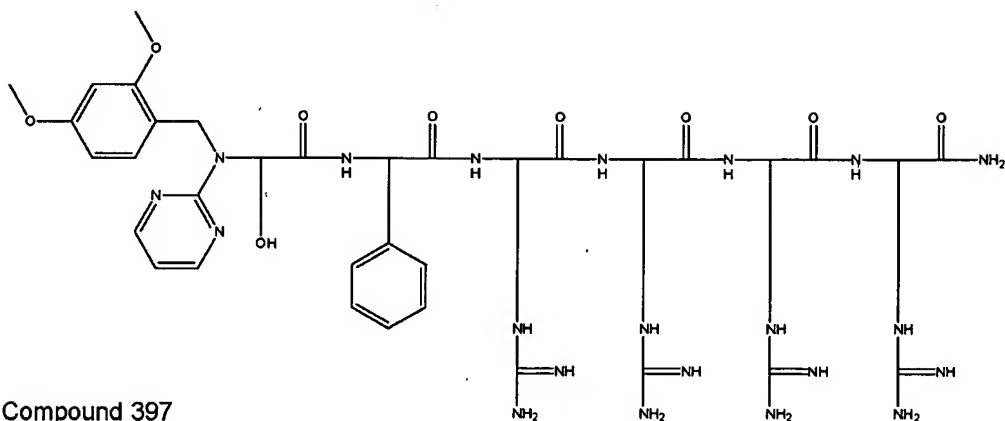
Compound 396

Applicant: David S. Lawrence

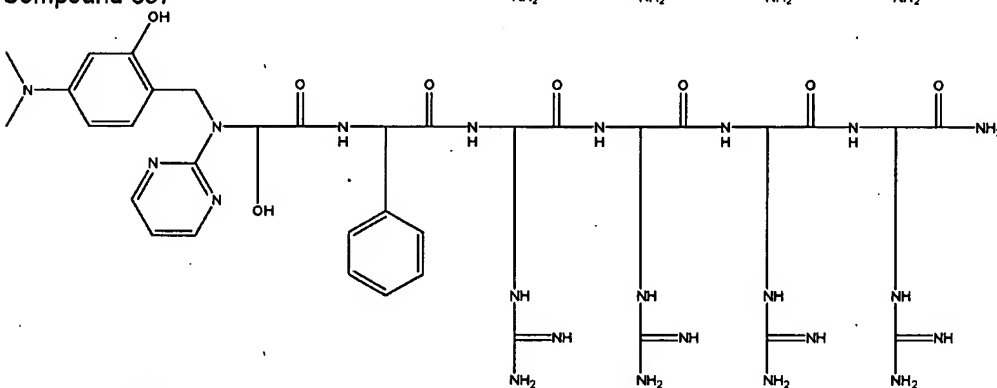
Serial No.: 10/755,086

Filed: January 9, 2004

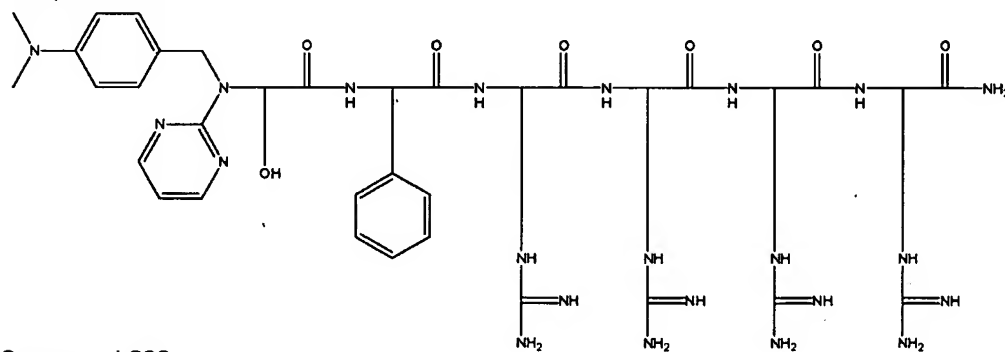
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Compound 397



Compound 398



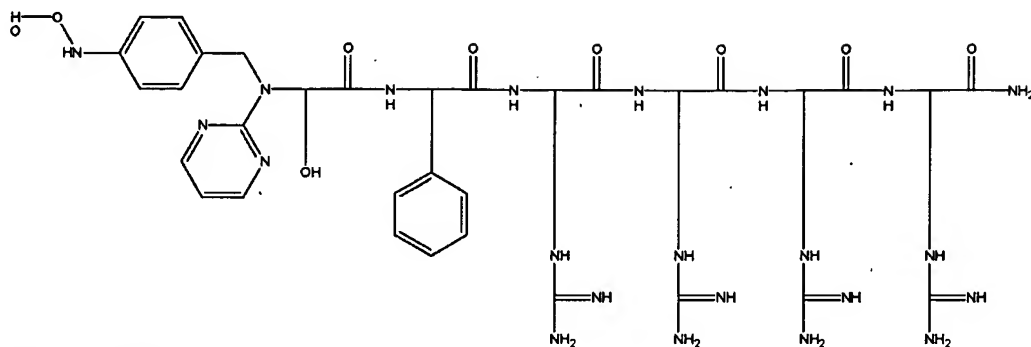
Compound 399

Applicant: David S. Lawrence

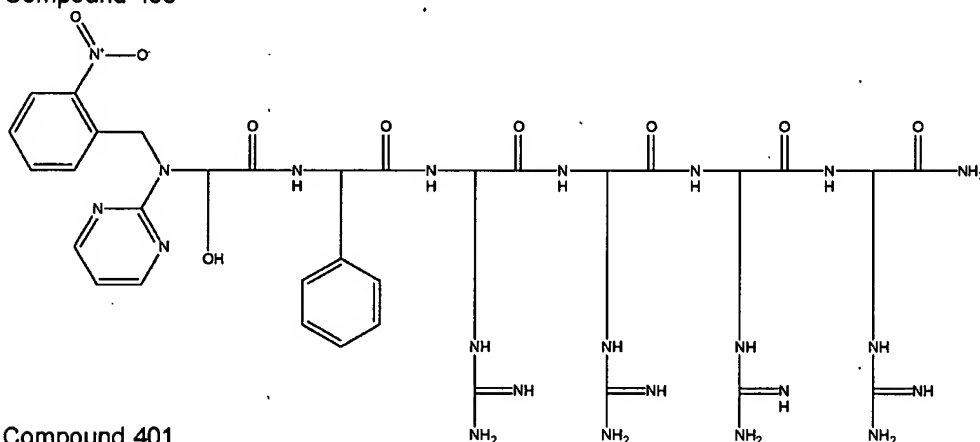
Serial No.: 10/755,086

Filed: January 9, 2004

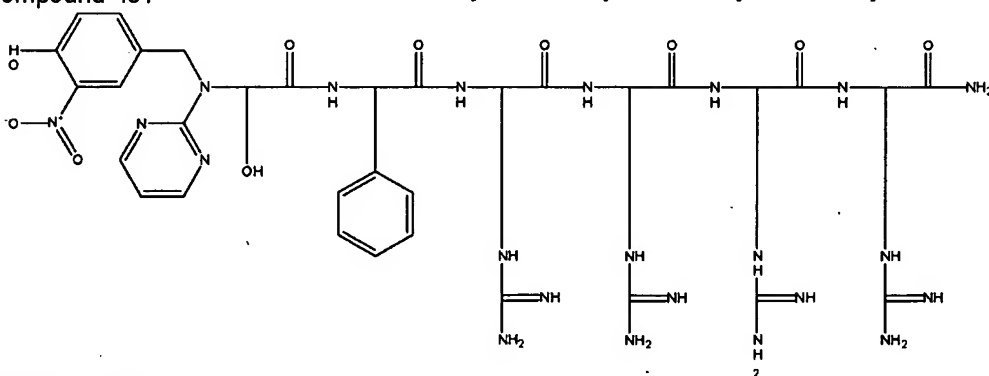
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Compound 400



Compound 401



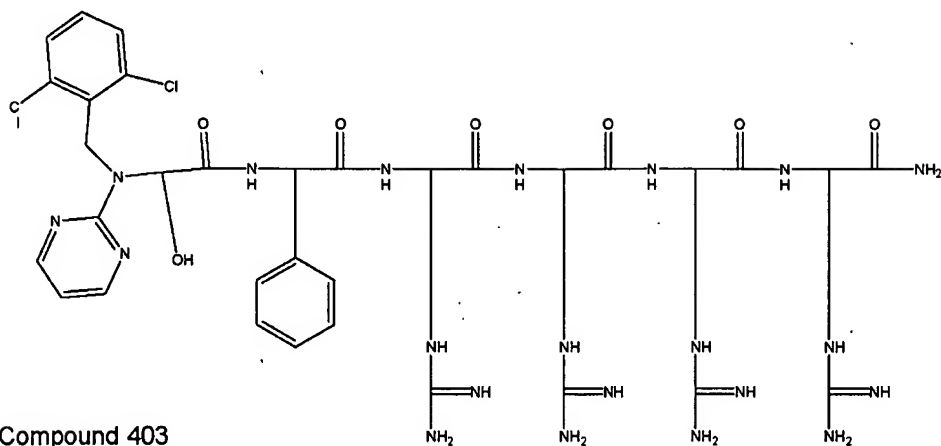
Compound 402

Applicant: David S. Lawrence

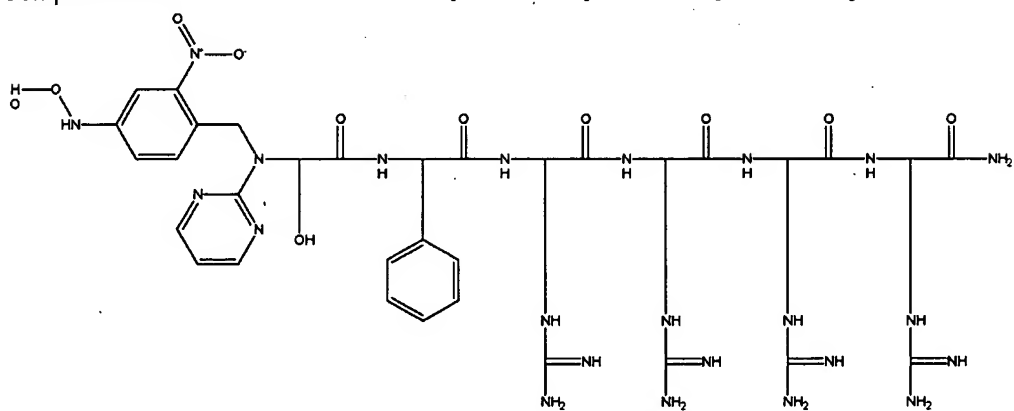
Serial No.: 10/755,086

Filed: January 9, 2004

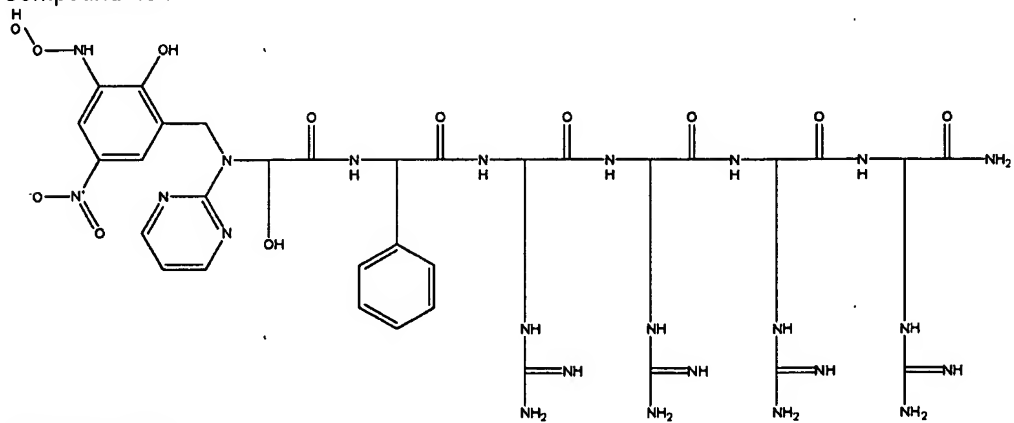
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Compound 403

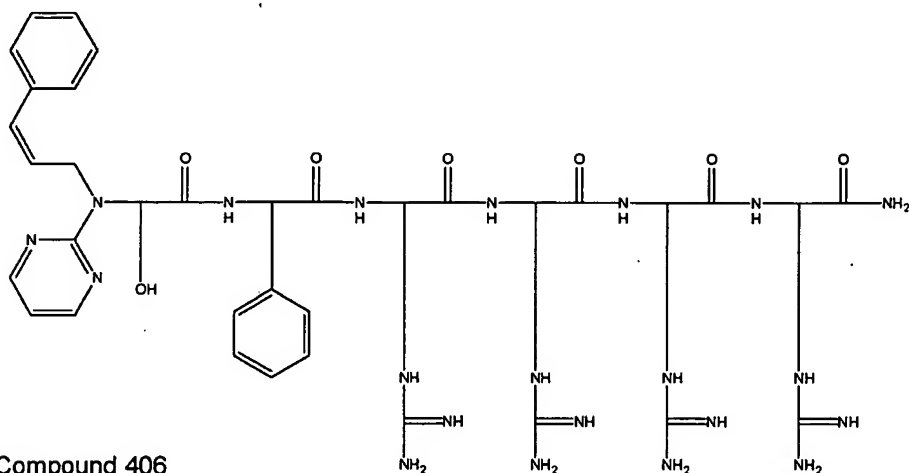


Compound 404

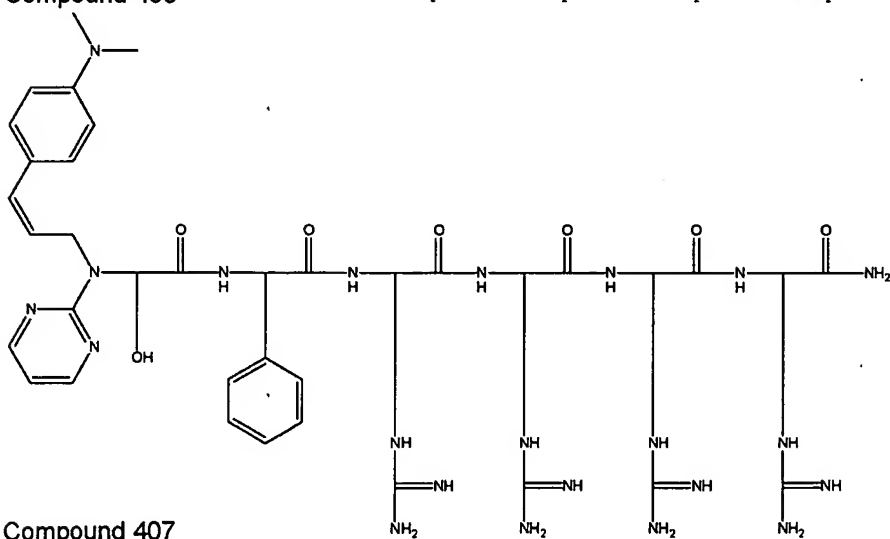


Compound 405

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Compound 406



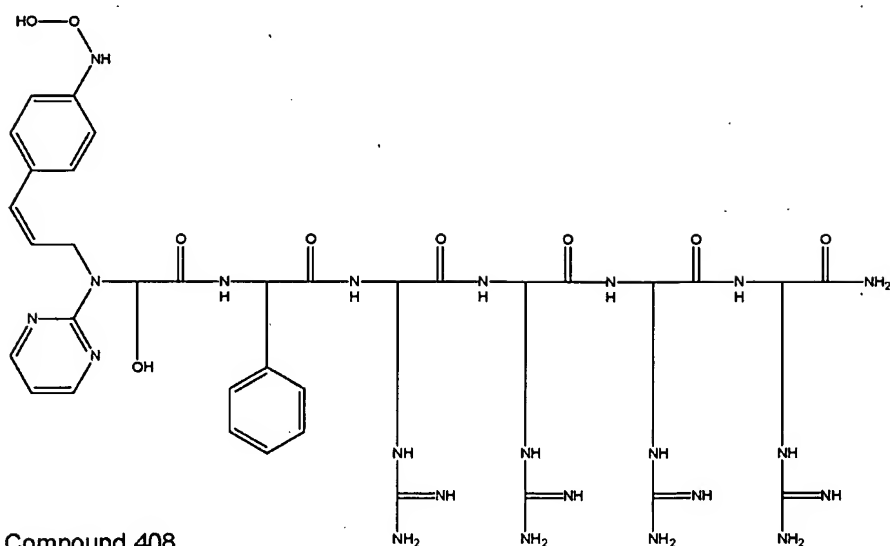
Compound 407

Applicant: David S. Lawrence

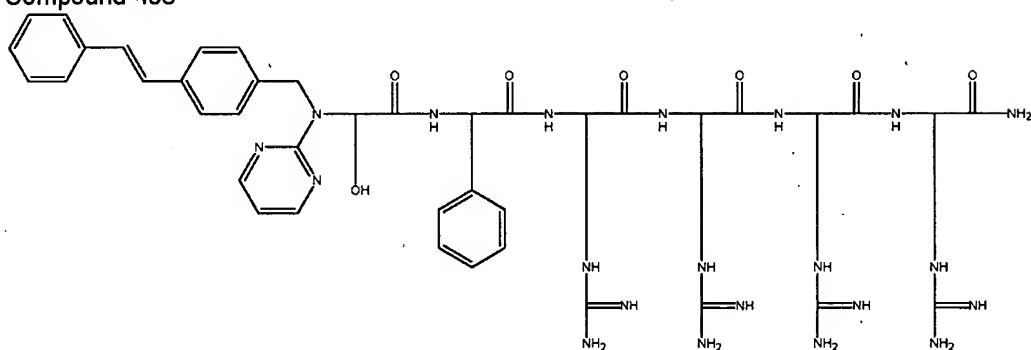
Serial No.: 10/755,086

Filed: January 9, 2004

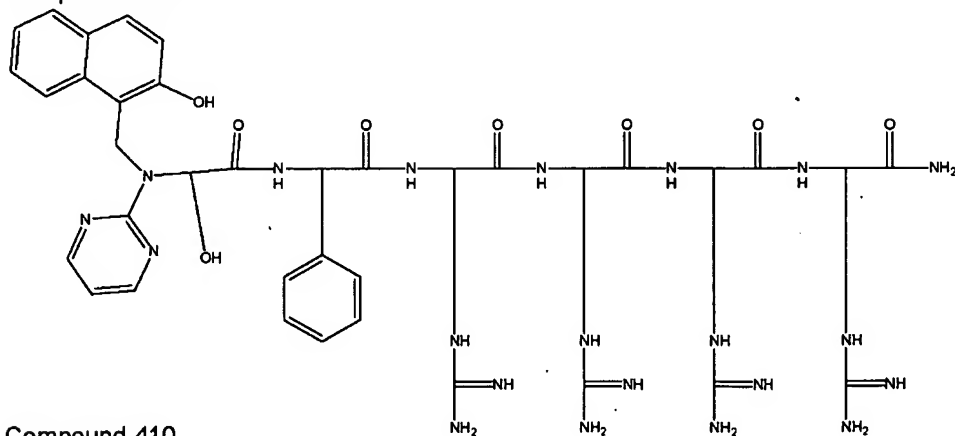
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Compound 408



Compound 409



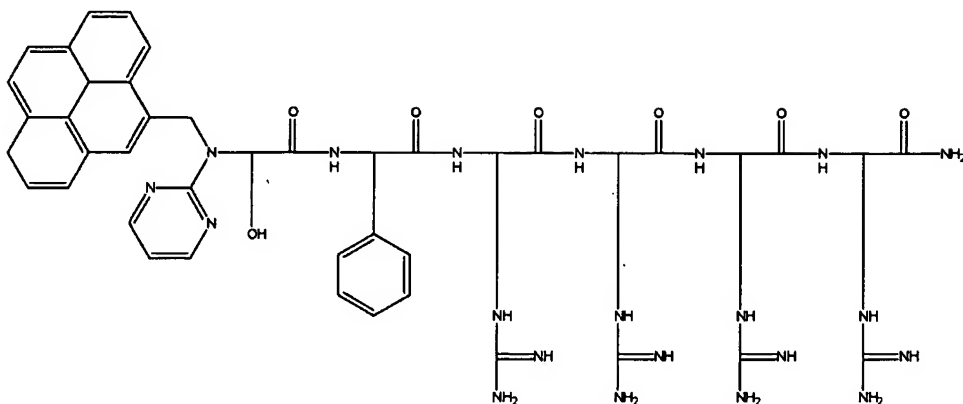
Compound 410

Applicant: David S. Lawrence

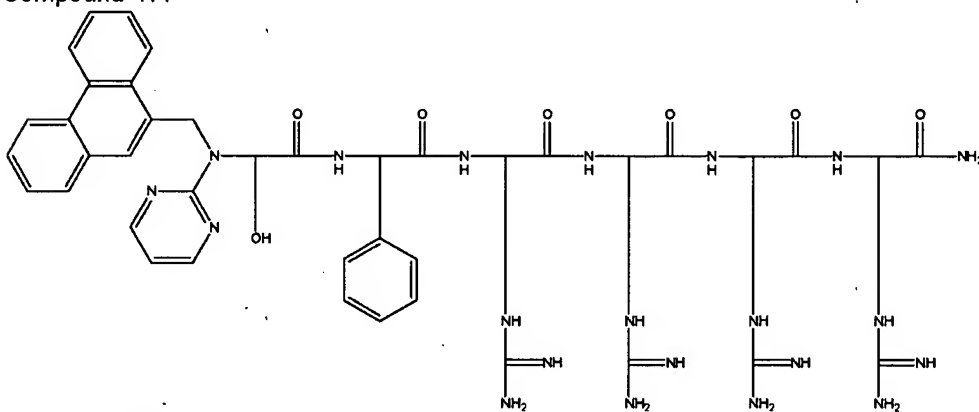
Serial No.: 10/755,086

Filed: January 9, 2004

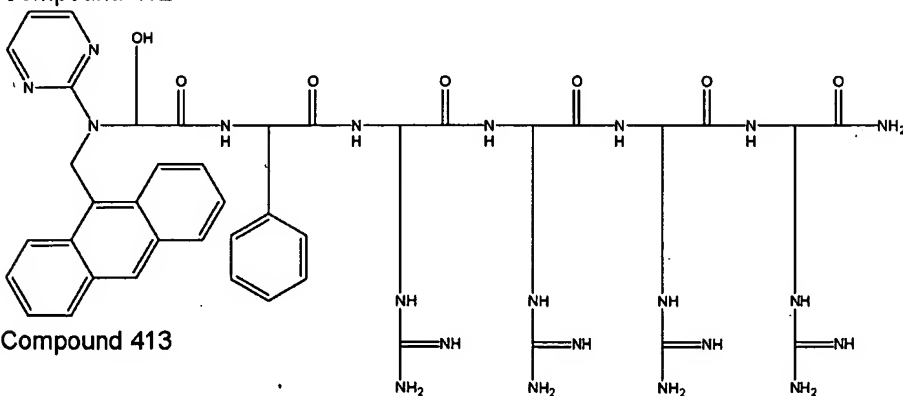
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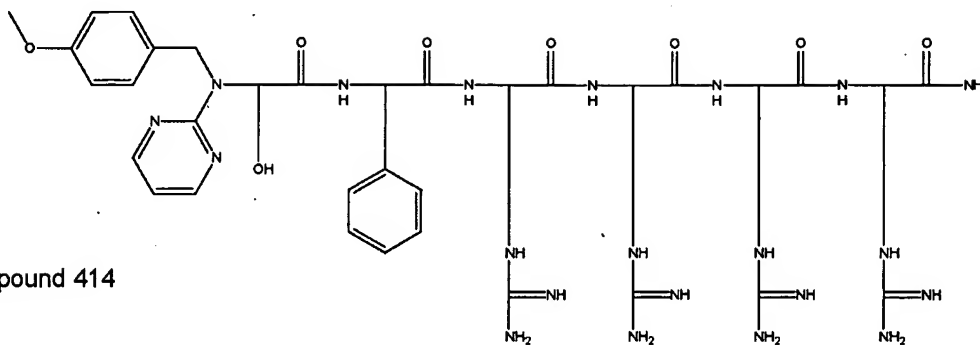
Compound 411



Compound 412

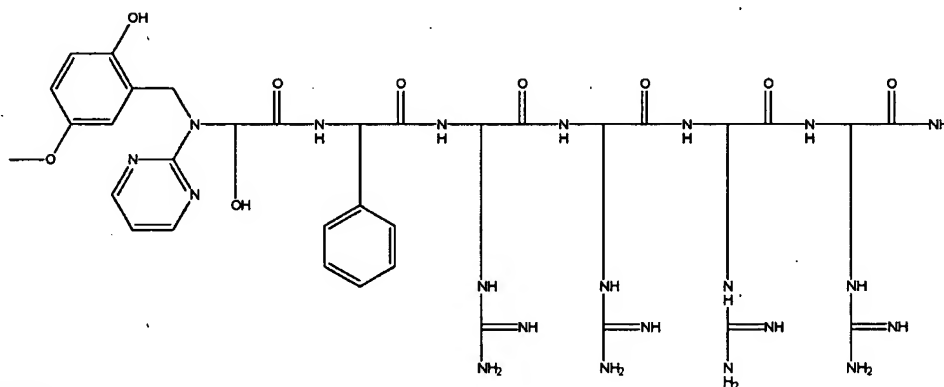


Compound 413



Compound 414

and

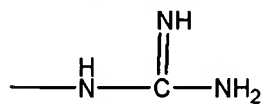


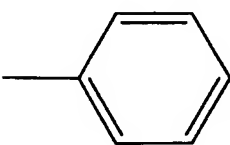
Compound 415

wherein amino acid chains are indicated as follows:

-OH represents serine,

-NH₂ represents lysine,

 represents arginine, and

 represents phenylalanine.

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[illegible]

Chemical structures of 11 bicyclic and heterocyclic amino acid derivatives, labeled a through l:

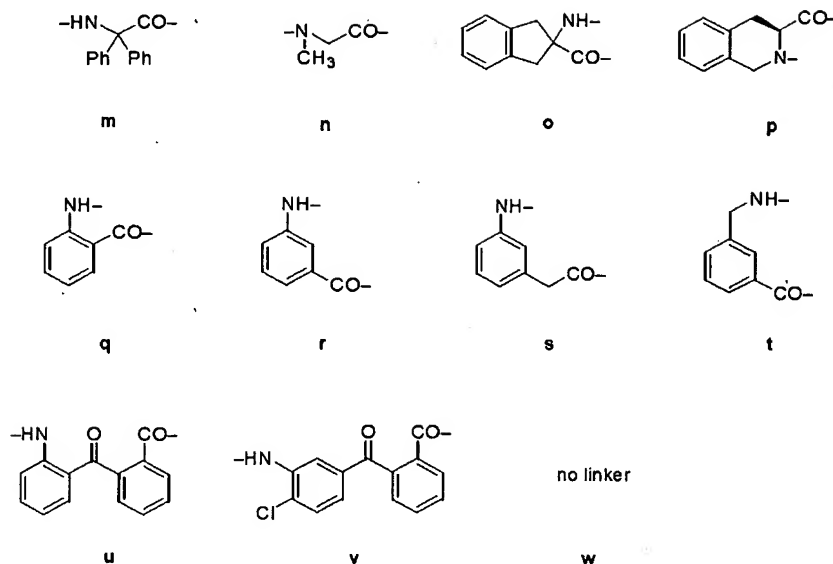
- a**: 1-methylpyrrolidine-2-carboxamide, with the methyl group on a dashed bond.
- b**: 1-methylpyrrolidine-2-carboxamide, with the methyl group on a wedged bond.
- c**: 2-oxo-2-phenylpyrrolidine-3-carboxamide.
- d**: 2-oxo-2-phenylpyrrolidine-3-carboxamide, with a carboxylic acid group (CO₂H) instead of an amide.
- e**: 2-(1H-imidazol-2-yl)pyrrolidine-3-carboxamide.
- f**: 2-(4-nitrophenyl)pyrrolidine-3-carboxamide.
- g**: 2-(3-pyridyl)pyrrolidine-3-carboxamide.
- h**: 2-oxo-2-phenylpyrrolidine-3-carboxamide, with the amide group (NH-) on a wedged bond and the carboxylate group (CO-) on a dashed bond.
- i**: 1-azabicyclo[1.1.0]butane-2-carboxamide.
- j**: 1-azabicyclo[2.1.0]pentane-2-carboxamide.
- k**: 1-azabicyclo[3.1.0]hexane-2-carboxamide.
- l**: 1-azabicyclo[2.2.1]heptane-2-carboxamide.

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90. (Currently amended) A chemical compound having the structure:

fluorophore-LINKER-X-FRRRRK-amide (SEQ ID NO:3);

wherein F is phenylalanine; K is lysine; R is arginine; and X is serine, threonine, or tyrosine, and wherein the linker is selected from the group consisting of a carboxamide linker, an aminobenzoic acid linker, a sulfonamide linker, a urea linker, a thiourea linker, an ester linker, a thioester linker, an alkylamine linker, an arylamine linker, an ether linker, and a thioether linker.

91. (Original) The chemical compound of claim 90, wherein the fluorophore is a 7-nitrobenz-2-oxa-1,3-diazole derivative.

92. (Withdrawn and Currently amended) The chemical compound of claim 90, wherein the fluorophore comprises is a fluorescein group derivative.

93. (Withdrawn and Currently amended) The chemical compound of claim 90, wherein the fluorophore comprises ~~is selected from the group consisting of~~ a dansyl group derivative, an acridine group derivative, an Alexa Fluor group derivative, a BODIPY group derivative, an Oregon Green group derivative, a Rhodamine Green group derivative, a Rhodamine Red-X group derivative, a Texas Red group derivative, a Cascade Blue group derivative, a Cascade Yellow group derivative, a Marina Blue group derivative, a Pacific Blue group derivative, an AMCA-X group derivative, or ~~and~~ a coumarin group derivative.

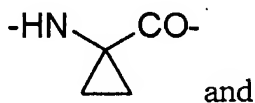
94. (Withdrawn) The chemical compound of claim 90, wherein the linker is a metal chelating linker.

95. (Canceled)

96. (Withdrawn and Currently amended) ~~The chemical compound of claim 90; A~~ chemical compound having the structure:

fluorophore-LINKER-X-FRRRRK-amide (SEQ ID NO:3);

wherein F is phenylalanine; K is lysine; R is arginine; and X is serine, threonine, or tyrosine, wherein the linker is selected from the group consisting of N-methyl glycine, L-proline, D-proline,

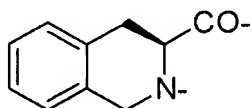


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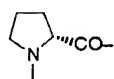
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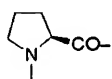
97. (Currently amended) ~~The chemical compound of claim 90,~~ A chemical compound having the structure:

fluorophore-LINKER-X-FRRRRK-amide (SEQ ID NO:3);

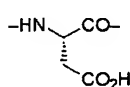
wherein F is phenylalanine; K is lysine; R is arginine; and X is serine, threonine, or tyrosine, wherein the linker is selected from the group consisting of the following:



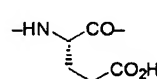
a



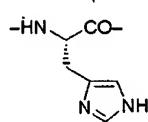
b



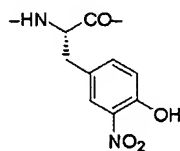
c



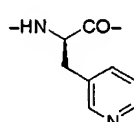
d



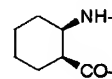
e



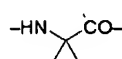
f



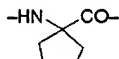
g



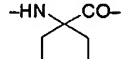
h



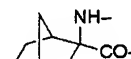
i



j



k



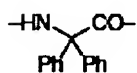
l

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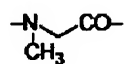
Serial No.: 10/755,086

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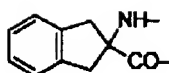
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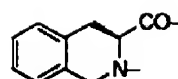
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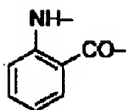
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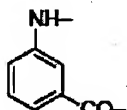
o



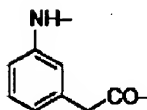
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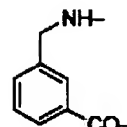
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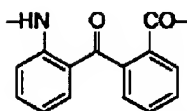
r



s

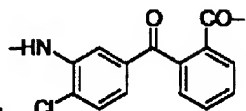


t



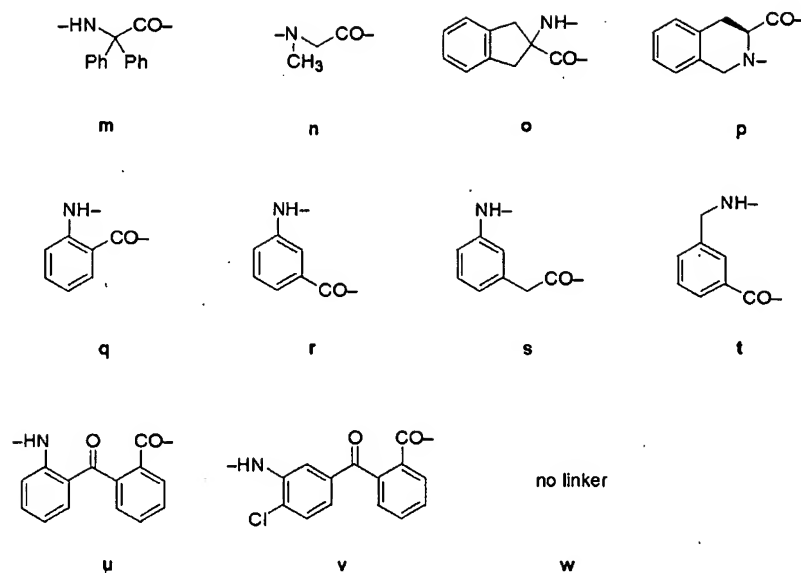
u

and



v

[[



]]

98. (Original) The chemical compound of claim 90, wherein the chemical compound is a substrate for a protein kinase.

99. (Original) The chemical compound of claim 98, wherein the chemical compound is specific for protein kinase C.

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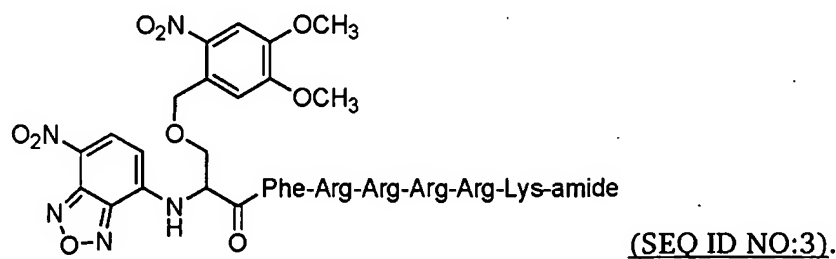
100. (Original) The chemical compound of claim 99, wherein the chemical compound is specific for isoforms α , β , and γ of protein kinase C.

101. (Withdrawn) The chemical compound of claim 98, the chemical compound is specific for protein kinase A, protein kinase B, protein kinase D, protein kinase G, Ca^{2+} /calmodulin-dependent protein kinase, mitogen-activated protein kinase, protein kinase mos, protein kinase raf, protein tyrosine kinase, tyrosine kinase abl, tyrosine kinase src, tyrosine kinase yes, tyrosine kinase fps, tyrosine kinase met, cyclin-dependent protein kinase, or cdc2 kinase.

102. (Original) The chemical compound of claim 90, wherein the chemical compound further comprises a carbohydrate, a lipid or a nucleic acid.

103-121. (Canceled)

122. (Currently amended) A chemical compound having the structure



123. (Previously presented) A composition comprising a chemical compound of claim 89, and a carrier.

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124-126. (Canceled)

127. (Previously presented) The substrate of claim 60, wherein the substrate comprises a metal ion chelator.

128. (Original) The substrate of claim 127, wherein the metal ion is a magnesium ion or a calcium ion.

129. (Previously presented) The chemical compound of claim 90, wherein a metal ion chelator induces a change in fluorescence intensity.

130. (Original) The chemical compound of claim 129, wherein the metal ion is a magnesium ion or a calcium ion.

131. (Original) The chemical compound of claim 129, wherein the change in fluorescence intensity is at least a 20% change in fluorescence intensity.

132. (Canceled)

133. (Previously presented) The chemical compound of claim 90, wherein the linker comprises a turn to position the fluorophore in a location closer to the serine, the threonine or the tyrosine than the location the fluorophore would occupy in the absence of a turn in the linker.

134. (Previously presented) The chemical compound of claim 89, wherein the linker comprises a turn to position the fluorophore in a location closer to the terminal

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serine, the terminal threonine or the terminal tyrosine than the location the fluorophore would occupy in the absence of a turn in the linker.

135-136. (Canceled)

137. (Previously presented) The composition of claim 123, wherein the composition is a pharmaceutical composition and the carrier is a pharmaceutically acceptable carrier.

138. (Previously presented) A composition comprising the substrate of claim 49, and a carrier.

139. (Previously presented) The composition of claim 138, wherein the composition is a pharmaceutical composition and the carrier is a pharmaceutically acceptable carrier.

140. (Previously presented) A composition comprising the compound of claim 88, and a carrier.

141. (Previously presented) The composition of claim 140, wherein the composition is a pharmaceutical composition and the carrier is a pharmaceutically acceptable carrier.

142. (Previously presented) A composition comprising the compound of claim 90, and a carrier.

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143. (Previously presented) The composition of claim 142, wherein the composition is a pharmaceutical composition and the carrier is a pharmaceutically acceptable carrier.

144-145. (Canceled)

146. (Previously presented) A composition comprising the compound of claim 122, and a carrier.

147. (Previously presented) The composition of claim 146, wherein the composition is a pharmaceutical composition and the carrier is a pharmaceutically acceptable carrier.

148. (Previously presented) The substrate of claim 56, wherein a photolabile side chain is attached to the serine, the threonine, or the tyrosine on the terminal end of the peptide, wherein the photolabile side chain blocks transfer of a phosphoryl group from adenosine triphosphate to a hydroxyl moiety of the serine, the threonine, or the tyrosine so that the substrate cannot be phosphorylated by a protein kinase until the photolabile side chain is removed from the substrate.

149. (New) A composition comprising the substrate of claim 83, and a carrier.

150. (New) The composition of claim 149, wherein the composition is a pharmaceutical composition and the carrier is a pharmaceutically acceptable carrier.